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Railway Age

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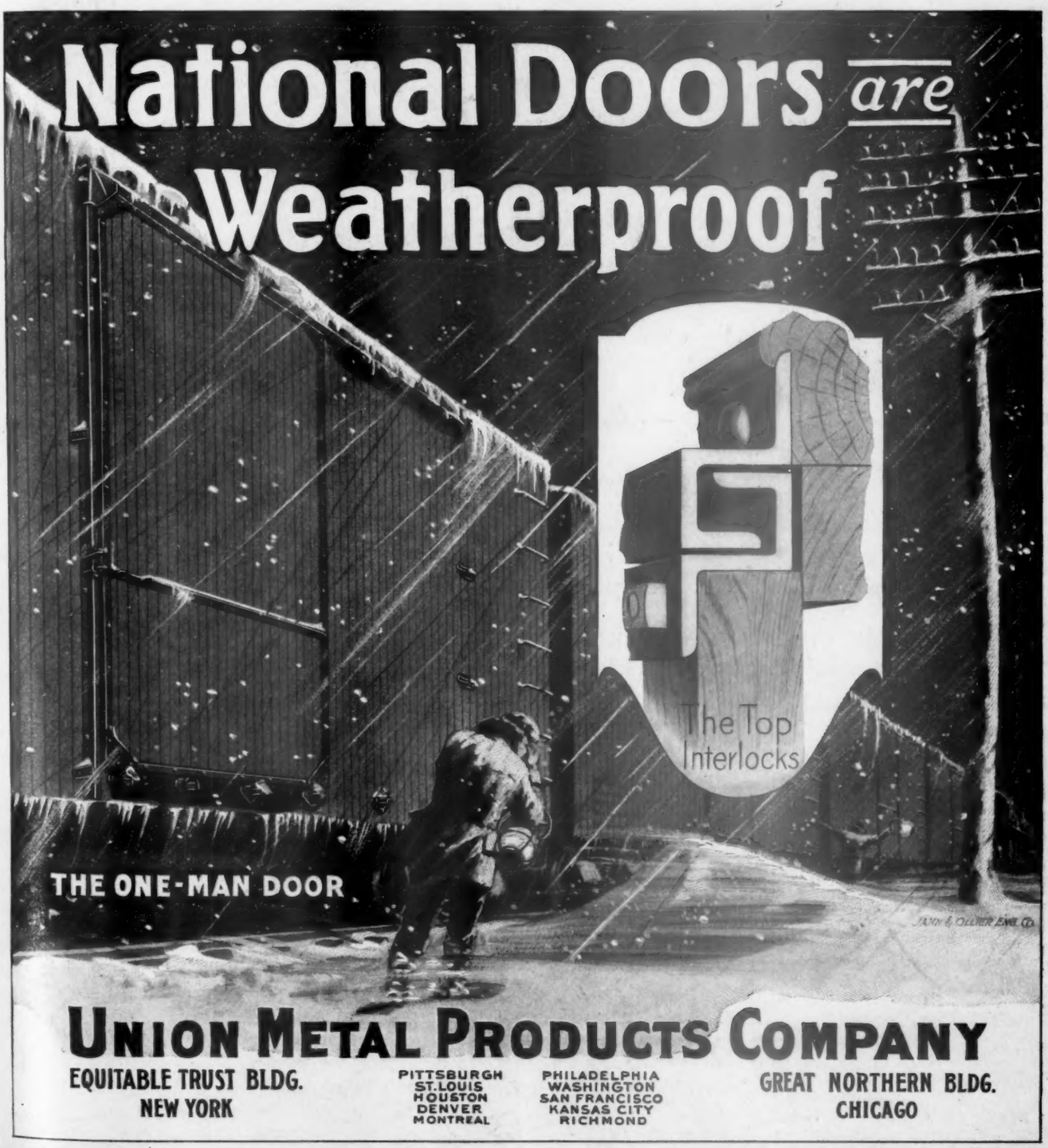

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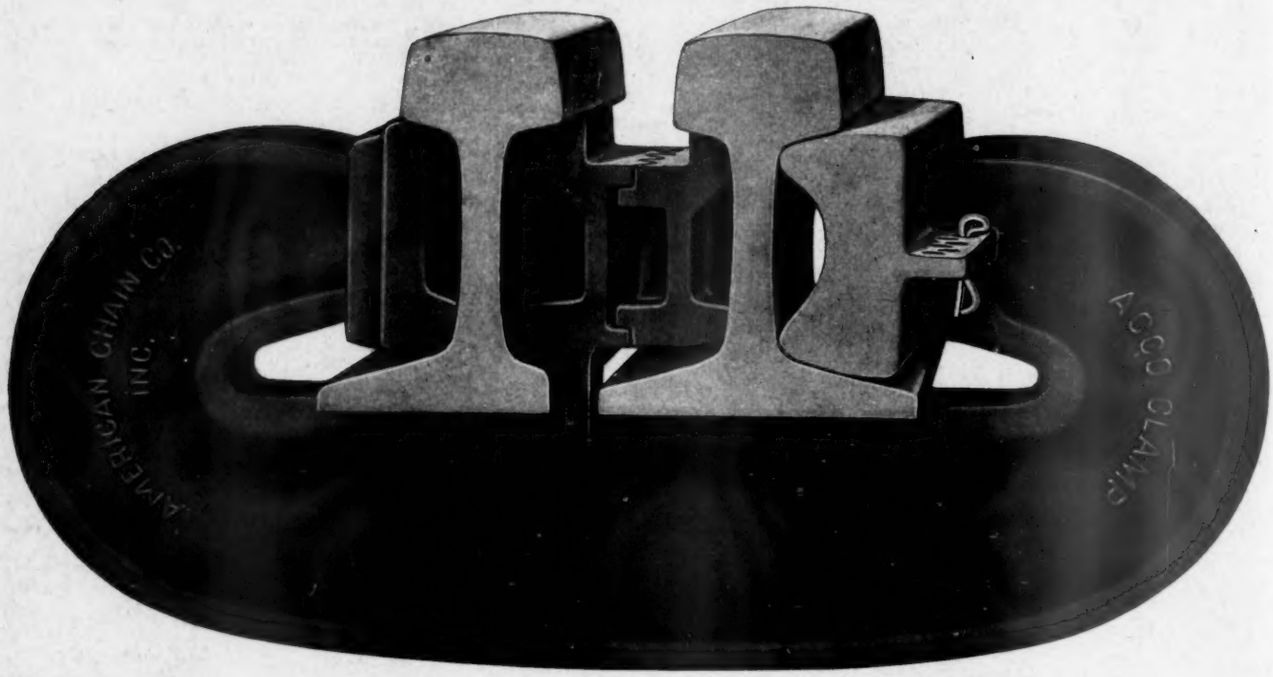
"Acco" Drop Forged GUARD RAIL CLAMP



ACCO GUARD RAIL CLAMPS are drop forged from open hearth steel of an analysis equal to that of your rail specifications and afterwards heat treated to the required physical properties.

The design provides for an increased metal section at points under greatest tension. Filler blocks, end blocks and wedge are made of cast steel and heat treated.

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American Chain Company

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EDITORIAL

Railway Age

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An Order for 225 Locomotives

The Pennsylvania announced last week, as noted in the Equipment and Supplies column of the *Railway Age* of January 13, that it had authorized the purchase of 300 locomotives, all for delivery this year, and orders for 225 of which have been placed. This is the largest single order for locomotives that has been placed for some time, but as important as that detail may be, it is by no means the only important one. The order supplements the purchase of 115 locomotives during 1922 and will effect a decided improvement in the Pennsylvania's motive power situation. It means also that the Pennsylvania, which in 1921 made a net charge to additions and betterments of only $1,000,000 when it should have charged nearer $50,000,000, has been able to take another very important step toward making up for the lack of physical improvement which conditions have prevented it from making during the past three or four years. The placing of the order emphasizes also that the equipment market is starting the year 1923 with a continuance of the buying which characterized most of last year, and the latter part of last year in particular. But the interesting feature in that connection is that as large and important as the order for 225 locomotives may be, it is only a part of the large volume of business which has thus far been reported as 1923 business. In last week's *Railway Age* orders were also reported for 4,520 cars for United States railroads and 3,076 freight cars for Canada. This volume of orders for a single week, as also the number of inquiries for locomotives and cars now pending, looks encouraging, to say the least.

Britain's Four Railways

The British railways are to be congratulated upon their success in virtually completing in little more than a year the great task of consolidating more than a hundred separate companies into four, as required by the Railways Act of 1921. This consolidation has been effected by the exchange of securities of the old companies for those of the new and not by leases, the acquisition by one company of ownership of a majority of stock in another and other like devices which would have made consolidation simpler, but which would have resulted in a financial structure beyond the easy comprehension of the average investor. Indeed the method of consolidation by amalgamation has greatly simplified railway finance and where formerly several varieties of securities of many companies were in the hands of the investing public, there are now the issues of but four companies to be dealt with—a fact which should tend to increase the attractiveness of investment in railways rather than otherwise. The companies were required to complete their amalgamation plans before January 1, 1923, failing which an "Amalgamation Tribunal" was to determine the terms of consolidation. This tribunal will have little to do, contrary to the expectations of observers a year ago. Railway consolidation in Great Britain has been upon a regional basis and the new systems are, generally speaking, non-competitive. The names of the new companies are the London & North Eastern, the London, Midland & Scottish, the Great Western and the Southern. Thus has begun a new era in British railway history and one which those responsible for American railway policy may well watch closely for the lessons that experience under the new arrangement is sure to teach.

Machine Tool Needs Outlined

Under the title, "Lack of Modern Machinery Handicaps Railroads," an article in this issue emphasizes the importance of machinery in reduced labor costs, indicating some of the conditions which have brought about the present serious machine tool deficiency in railroad shops, and suggesting methods of overcoming it. Without doubt, railroad net earnings are appreciably reduced by the many obsolete and inefficient machines now used in railroad shops and engine-houses. Repair costs are excessive, and equipment is held out of service longer than should be necessary, with resultant loss of revenue. The article points out that in many, if not most, railroad shops, the machine department is the factor which limits output, lack of modern machinery making it impossible to repair more than a certain number of locomotive parts in this department. In general, not enough money has been spent for machinery in recent years to maintain existing machine facilities properly, let alone take care of increased needs. As a result, many old machines are kept in service long after their effective life is past. In fact the average age of machine tools in shops of some of the most prosperous railroads is about 20 years. Machines of that age are not sufficiently powerful to utilize the cutting powers of high-speed steel, with the result that cutting feeds and speeds must be lowered. In addition, the older types of machines are greatly inferior in convenience, ease, and speed of operation, with resultant high labor costs. Comments made in the article regarding the need for improved purchasing methods, constructive machine tool programs or budgets, and a better balance between rolling equipment and machine facilities are worthy of study by railroad men interested in cutting down maintenance of equipment costs.

Cost of Grade Crossing Elimination

As a measure for relief of unemployment in England, correspondents writing in the Times (London) propose as one worth-while activity the elimination of railway grade crossings. There is nothing particularly novel to American experience about such a proposal. Any number of American citizens each year write to the newspapers proposing that railway grade crossings be eliminated. The unexpected feature of the plan as advanced in England is that the railways be asked to contribute in proportion *to the saving in annual expenditure in comparison with the costs of existing grade crossings.* The remainder of the expense would be borne by the public.

This method is certainly a fair one. For the public there is greater safety and convenience and for the railway reduced expense in crossing protection. The public and the railways make the improvement and share the expense according to the benefit each derives from it. More work would be done along these lines in this country if the American people had this common-sense attitude toward the problem. On the other hand, if a great "drive" were instituted to eliminate grade crossings on this basis of cost-sharing, the railroads might find more than a few crossings where protection and occasional accidents are costing them enough to pay interest on an investment large enough to cover the cost of elimination with little or no contribution from the public.

No Revolutionary Change

The *Railway Age* has from time to time referred in these columns to the desirability of better railway annual reports. There has been, however, no desire to suggest that any particularly revolutionary changes in the ordinary methods of putting together the annual report are necessary for the desired degree of improvement. Thus far nothing has been suggested that is not already being done by one or a number of roads. There are several companies, the annual reports of which include most of the desirable features which the *Railway Age* has tried to bring out. Among these companies may be mentioned off-hand, the Southern, the Pennsylvania, the Lackawanna, the Lehigh Valley, the Delaware & Hudson, the Southern Pacific, etc. These reports look in general the same as any other annual reports. A cursory glance through them will show that they are presumably compiled in exactly the same manner and are apparently intended to accomplish the same results. But there is a difference. This is that there seems to be a better selection of material presented, a better co-ordination of the data of various sorts and a better arrangement. They seem much easier to use. The basic details that one looks for in an annual report seem more readily available and there is given in general a more adequate idea of what really took place on the railroad during the period which it purports to cover, or indeed, of what is taking place at the time the report is published, should its publication, perchance, follow some time after the close of the year. The stockholder, the bondholder or the investigator, whoever he may be, does not read an annual report to pass the time or for his intellectual betterment. He reads it because he wants certain information concerning his investment or concerning the railroad which he is studying. He will be much better pleased if this information is handy and clear and if there is enough of it without too much extraneous matter. It does not seem to require a revolutionary change to improve annual reports so as to bring about this simple result.

Desirable Qualities of Metal

Steel, the great structural material of the twentieth century, has two undesirable qualities for certain classes of service in that it is relatively heavy, and corrodes rapidly when exposed unprotected to the weather. It was at first supposed that steel cars would last almost indefinitely but experience quickly proved the error of this idea. Steel freight cars in particular cannot always be kept painted. The plates rust and deteriorate in a few years, this action being greatly hastened by the formation of acids in the case of certain cars such as those hauling high-sulphur coal. In locomotive service the steel is usually protected from rust by paint or oil, but the weight here presents a serious problem. Heavy reciprocating parts cannot be properly counterbalanced, with resultant loss of engine efficiency and an undesirable pounding action on the locomotive frames and rails. The advantages of lightness combined with strength in locomotive motion work is apparent, and mechanical engineers are, therefore, watching with marked interest the development of a new aluminum alloy which weighs one-third as much as steel, and has a tensile strength and physical characteristics approaching those of mild steel. This alloy, known as Duralumin, is also being experimented with as a material for car doors. It offers strong resistance to the action of air and water and promises to effect important economies when used in structures requiring strength and subject to weather conditions. Other physical advantages of importance are the ease with which it can be forged, hot-worked, heat-treated and machined. Duralumin is being made in America by two companies, holding licenses under the Chemical Foundation. The cost of manufacturing it as now produced is so high as to confine it practically to the automotive field in which high premiums are paid for the combination of light weight, strength and resistance to atmospheric action. As the methods of production are improved, however, it is quite possible that the cost may be decreased so that it will be economical to use Duralumin in the construction of certain parts of cars and locomotives.

The C. & O.'s New Venture

The recent action taken by the Chesapeake & Ohio in appointing a superintendent of water service with system jurisdiction is a development of more than ordinary interest. While not a new thing in railway operation (similar action having been taken heretofore by other roads), it operates to reawaken the interest of managements, particularly those of properties not yet so provided, in the subject of departmentalizing this branch of service—for departmentalizing in effect is what the Chesapeake & Ohio has done. The reason for the institution of this change is a simple one. The Chesapeake & Ohio discovered what other roads have discovered; that the accustomed method of handling its water supply, however satisfactory it may have appeared in theory, was not working to perfection in practice. A detailed investigation made by a specialist in railway water supply, with the co-operation of the engineering, operating and mechanical departments, disclosed flagrant instances of water waste. It disclosed the presence of equipment unsuited or inadequate for present needs. It disclosed uneconomical methods of operation. It disclosed, in short, all the weaknesses to be anticipated in a water supply, the responsibilities for the upkeep, operation and expansion of which are divided. In such a condition the water supply was satisfactory to no department. It constituted a serious leak in expenditures and invited overhauling. In appointing a superintendent of water service it is plainly the belief of the Chesapeake & Ohio that a pressing need exists for a departmentalization in this branch of railway enterprises exemplified by an officer free to devote his entire attention to the subject and in a position, with his staff, to work with the various departments and to supervise those operations which call for specialized training. The Chesapeake & Ohio has taken a wise step in thus departmentalizing its water supply and with the support of the management and the co-operation of all departments concerned, the company will profit greatly by the arrangement; an observation which would seem to deserve serious consideration by the managements of other roads, particularly when it is known that the findings made on the Chesapeake & Ohio were impressive enough not only to command the attention of the president, but of the directors as well.

Carry Out the Rate-Making Provisions

THE most interesting and important question immediately pending with respect to regulation of railways is the question of what policy the Interstate Commerce Commission is going to follow in the future under the rate-making provisions of the Transportation Act. The time has at last come when nobody can seriously contend that the commission cannot so administer these provisions as to enable the railways to earn a "fair return." The commission held in 1920 that a fair return at that time would be 6 per cent on the valuation then made by it. It more recently held that from March 1, 1922, 5¾ per cent would be a fair return. The railways have never in a single month since the Transportation Act was passed three years ago earned as much net return as the act and the commission itself have said would be reasonable. When, we respectfully ask, does the commission intend to begin to so regulate rates as to enable the railways to earn a fair return?

The Transportation Act puts upon the railway managements the responsibility of honestly, efficiently and economically managing the railways. It puts upon the Interstate Commerce Commission itself the responsibility of so regulating the rates that they will earn a fair return. It says that "the commission *shall* initiate, modify, establish or adjust such rates so that carriers as a whole (or in groups) will under honest, efficient and economical management and reasonable expenditures for maintenance of way, structures and equipment earn an aggregate net annual income equal, as nearly as may be, to a fair return upon the aggregate value of the railway property." This does not say that the commission "may" thus fix rates, or that it "shall" so fix them if the railways ask it to. It is an explicit direction from Congress to so fix the rates that they will yield a "fair return," and the language used, especially the word "initiate," shows that it would be the lawful duty of the commission to so fix the rates even if neither the railways nor anybody else asked it to. Congress, as the language of the law shows, gave the commission these instructions, not for the benefit of the railways, but for the benefit of the public. The reason why it gave the commission these instructions is made plain by the requirement that in determining what will be a fair return the commission "shall give due consideration to the transportation needs of the country."

The commission made a conscientious effort when it granted the advances in rates in 1920 to carry out these provisions in the spirit in which they were enacted. The great decline of prices and depression in business temporarily defeated this effort. In the early part of 1922, in spite of the fact that the railways never in a single month had earned what the law and the commission itself had said would be fair, and in spite of the fact that commodity prices and railroad traffic were increasing, the commission made a general reduction of rates. In consequence, although the railways handled a large business during the last year, and although it was the third year since the Transportation Act was passed, the railways went through the year with a net return about $400,000,000 less than the commission held would have been reasonable. We have now had three years of the Transportation Act during which the commission has never approached giving full effect to its rate-making provisions.

Of course the answer made is that conditions have been "abnormal." But the excuse of "abnormal" conditions cannot fairly be used indefinitely. Furthermore, all the conditions used as arguments for the reductions of rates made in the latter part of 1921 and the first half of 1922 have changed. The prices of practically all commodities have advanced substantially and railroad freight business has increased to a record breaking amount. Therefore, the conditions have become such that rates can, without any injustice to anyone, be so dealt with as to enable the railways to earn a fair return, and that they cannot be otherwise dealt with without doing injustice to the railways, disregarding the plain provisions and intent of the law and hindering the expansion of railway facilities which is required in the public interest.

We are not advocating an advance in rates. We are inclined to believe that if no reductions of the existing rates are made the railways in a comparatively short time, if the volume of traffic continues to be large, will become able to earn the average return that the commission has held would be fair. But there are those, especially certain western state railroad commissions, that are appearing before the Interstate Commerce Commission and demanding further reductions of rates. Those who are doing this are demanding in effect that, after the railways for three years have never earned the net return which the law and the commission have said would be fair, the commission shall disregard the plain provisions of the law and its own past public findings regarding a fair return, and render decisions which would continue to make it impossible for the railways to earn a fair return and to provide the country with the increased means of transportation which it needs.

It may be said that public opinion in some parts of the country as expressed at the recent election demands further reductions of rates and that unless they are granted the Transportation Act will be emasculated or repealed. But the Interstate Commerce Commission receives its instructions from the law which it administers, and it would be far better to have the law faithfully carried out even though this resulted in its repeal than to have it disregarded and nullified because of fear that it might be repealed.

What Government Control Cost the Taxpayers

ALTHOUGH on March 1 it will be three years since the railways were returned to private operation it is still impossible to say how much government control of railroads will finally cost the taxpayers of the United States, but statistics now available show that the total will be approximately $1,700,000,000. The recent annual report of the Interstate Commerce Commission gives information regarding this matter that has attracted less attention than it deserves.

When Walker D. Hines retired as director general of railroads in 1920 he estimated the total deficit which had been incurred during the 26 months of actual government operation at $900,478,756. Mr. Hines' estimate was based upon the assumption that the railways would not be able to substantiate their claims for large indemnities because of failure of the government adequately to maintain their properties. The railways, however, have been able to present such conclusive evidence of under-maintenance that the Railroad Administration has allowed claims upon this ground amounting to $125,428,810 and officially estimates that additional claims that will have to be allowed will amount to $97,167,664. The Interstate Commerce Commission estimates that it will have to allow claims of the short line railroads for deficits incurred in the first six months of government control which will add $15,000,000 to the forgoing amounts. The expenses incurred by the Railroad Administration from March 1, 1920, to January 1, 1922, in collecting the data and carrying on the negotiation, incidental to effecting settlements of the accounts of the government with

the railways arising from government operation amounted to $3,445,222. These items total $1,141,520,452, as the deficit already chargeable to government operation during the 26 months ending March 1, 1920.

When the railways were returned to private operation they were incurring larger deficits than ever before because of failure of the Railroad Administration to make sufficient advances in rates to cover the increased expenses. In addition demands of the employees were pending for large advances in wages which subsequently were granted by the Railroad Labor Board. Therefore, the government continued the guarantees for a period of six months. The Interstate Commerce Commission in its recent annual report estimated at $536,000,000 the amount that the government will have to pay the railway companies to reimburse them for the deficits incurred during these six months. We arrive then at the following result:

Deficit due to 26 months of government operation	$1,141,520,452
Deficit under guarantees for first six months under private operation	536,000,000
Total deficit due to government control	1,677,520,452

When all the settlements are finally made with the railway companies the total deficits incurred as a result of the government having taken over the railroads, and which the taxpayers will have had to pay, probably will be even larger than this. The average for the 26 months of actual government operation will be about $44,000,000 a month and the average for the entire 32 months during which the railways were guaranteed the "standard return" will be about $52,000,000 a month.

The country's first experience with government operation of its railroads has been an expensive one for everybody, but most expensive of all for the taxpayer.

Modernize Tie Purchasing Methods

THE railways spend more money for ties than for any other item of material except fuel. They buy more than one hundred million ties annually for renewals and additions, for which they pay out more than $150,000,000. If the labor of inserting them in the track is included, these figures are increased by one-third. In other words, over three cents of every dollar which the railways earn goes for ties. Surely an expenditure of this magnitude deserves the most careful attention to insure that the maximum value is secured. Yet the railways buy few materials less systematically.

Because of their magnitude, tie contracts always have been prizes much sought after. A generation ago their allotment was commonly considered to be a prerogative of the railway president. Competition was limited or non-existent. Timber was plentiful and the ties produced were in general of excellent quality. There was, therefore, little occasion for either the purchasing or the using department—the maintenance-of-way department—to give much attention to the selection or inspection of the ties. Maintenance officers confined their activities primarily to the determination of the number required and the purchasing department to their distribution over the system.

With the development of the railways, however, and the necessity for greater specialization and centralization of work, the buying of ties has been turned over to the purchasing department on most roads, with little or no suggestion from the chief executives, and is now handled as a regular part of the work of the buying organization. This change is to be commended for it has tended to remove abuses, or the appearance of abuses, which existed in the past. However, the purchase of ties has not yet been raised to the plane that the magnitude of expenditure for this class of material warrants.

This deficiency is evidenced in a number of ways. No single item of expense in the maintenance of the fixed railway properties approaches that of ties, yet maintenance officers frequently leave the selection of the kinds and grades of ties almost entirely to the purchasing departments. Until recently there has been no general definition or specification for a tie and now that one has been drafted it is being ignored or opposed by some of the roads it was designed to assist. The character of the inspection frequently fluctuates with the need for ties and the practice of "grading up" or of accepting ties which have been rejected by another road is not unusual. Chief executives who are convinced of the benefits accruing from the purchase of standard ties are often unaware of the acceptance of non-standard ties by their purchasing forces, or if aware of that condition are misled by pleas of peculiar or special conditions advanced as reasons for the failure to obtain standard ties. The deterioration of untreated ties in track results in large measure from the action of the elements, while the deterioration of treated ties is almost entirely mechanical. Both are practically continuous and their extent may be forecast far enough in advance to permit the ordering of a regular supply. Yet ties are purchased on a "feast or famine" policy, resulting in continued demoralization of the tie producing and distributing industries and adding to the price which the railroads are called upon to pay.

Few, if any, of these conditions are inherent in the problem. They are due almost, if not entirely, to the failure of railway executives to appreciate the heavy losses caused by haphazard and archaic methods of tie purchase. The opportunities for savings are so large and so far-reaching that they should challenge the attention of every alert railway management at the present time when it is considering its tie requirements for 1923 and later years.

The Problem of the Port of New York

NO ONE THING of late has been a greater indication of the need of intelligent public relationship work on the part of railroads than the present status of the eastern roads in regard to the Port of New York. Today the railroads entering the area of that port are, admittedly, in an unpleasant and embarrassing situation. They have now to appear before the Interstate Commerce Commission at a hearing where it will be decided what jurisdiction that body has in this situation and what shall be done towards enforcing the co-operation of the railroads and the Port Authority. Up to this time, the railroads have had little to say and the Port Authority much. While it may seem a little harsh to say, the present situation is largely the result of there having been involved six able men, all good and active publicists, but without actual railway experience on the one hand, and the heads of nine railroads, all good and active railway operating men but without much publicity experience, on the other hand. Both sides have a case and both cases appear soundly based if, for the moment, one forgets the elaborations which the Port Authority has incorporated into its plan.

The Port of New York is an evident, tangible reality to the public in and around New York City, many of whom cross some of its water at least twice daily. To the layman, the commuter, for instance, who rides back and forth on the ferry boats, not to speak of the task of dodging traffic on West street, the port does not look very efficient and neither

does it to the more experienced observer. As a matter of fact, it could never be considered as a model for other ports to pattern after but nevertheless it does function and produce results. However, this outward appearance makes it very easy to sway public opinion to the extreme view of believing that it is utterly inefficient and should be completely wiped out and old methods replaced by new ones. Perhaps so, and perhaps not—however, it should be recalled that economical and efficient railroad operation is neither attained overnight nor over a year. It comes from hard and painstaking study followed by such changes as are economically sound and financially possible. Does the public realize this? It does not, and no one will ever take the trouble to keep it informed correctly unless the railroads do it.

Naturally, the Port Authority believes its "comprehensive plan" to be about the last word for the solution of the port problem. The roads do not. Chief among the criticisms they offer, are that the plan does not take care of the enormous increase in passenger traffic, which has occurred in recent years, and that the proposed policies of co-ordination and consolidation of terminals, etc., will destroy the only "goods" they have left to "sell competitively," namely service. From this has grown a situation which, to many concerned, appears serious. Frankly, the *Railway Age* can see no reason for any great amount of worry in regard to the Port of New York or the Port Authority's plan. We have seen too many beautifully bound volumes of "plans" on the book shelves of railroads, architects, consulting engineers, city engineers and others, which have come to little or nothing or have served purely as guides for future changes comparatively small to the ultimates proposed.

It is true that the Interstate Commerce Commission has been brought into the matter by the Port Authority and it may order the railroads to co-operate with the port body in following out its plan and again it may not, according to how ably and well the railroads present their side of the case. Improvement of the New York harbor does not, in our opinion, lie along the lines proposed, i. e., the unifying of terminals and the continued ferrying, or otherwise transporting, of cars into Manhattan, now already too congested in that respect. Rather, it lies along the lines of freeing the waterfront of its present and fast growing passenger traffic and the development of adequate, well arranged, and convenient freight terminals along the New Jersey shore from which delivery in Manhattan can be made direct to the ultimate destination, via vehicular tunnels, bridges or ferries.

This would insure quick release of cars, prompt delivery, full loading of trucks and doubtless a greatly lessened vehicular congestion in the streets of the city itself, since the present trucking system is notoriously inefficient because of light loads and long delays at piers. Thus it cannot help but appear that enormous and doubtfully economical expenditures are being proposed for terminal and other changes merely to save about a mile of extra truck haulage.

If the Port Authority is really sincere—and there is no reason to doubt it—in its desire to have the railroads "co-operate" with it in the development of this port, then it in turn should "co-operate" with the railroads and in this respect "to co-operate" does not mean to endeavor to force the railroads to swallow the proposed plan in its entirety and as written.

THE TEXAS HIGHWAY ASSOCIATION has drawn a bill for submission to the Texas legislature which contains a provision declaring that motor vehicles using the highways for hire are subject to all of the restrictions regarding common carriers by rail and must apply to the commission for a certificate of public necessity and convenience, to be granted only after a public hearing.

Letters to the Editor

[*The* RAILWAY AGE *welcomes letters from its readers and especially those containing constructive suggestions for improvements in the railway field. Short letters—about* 250 *words—are particularly appreciated. The editors do not hold themselves responsible for facts or opinions expressed.*]

Comparing British and American Methods of Consolidation

NEW YORK CITY

TO THE EDITOR:

In one of your recent issues you refer to the British Railways Act of 1921 and you say very aptly that "a study of British practice might be of value to railway officers in this country who are interested in the subject of consolidation," especially in exchange of present securities for new ones. There are four features of that Act which are well worth study: (1) the ease with which all this has been done by Parliament as compared with the legal difficulties in this country; (2) the elimination of competition in service as well as rates; (3) the incorporation of new companies instead of continuing the old; (4) placing the basis of rates of the railroads not on physical value, nor cost, nor cost less depreciation, but on the earning power in 1913. The following is a synopsis of the British Act:

By this Act (11 & 12 Geo. 5, Ch. 55), it is ordered that for the "more efficient and economical working" of the railroads in Great Britain they shall be consolidated into four companies on plans to be submitted by January 1, 1923, failing which a government "amalgamation tribunal" shall prescribe the plans. Four new amalgamated companies are to be organized to take over the properties and issue securities in exchange for the stocks, bonds and debts of the old companies. 26 "constituent companies" now existing and 93 "subsidiary companies" are specified as included in the "amalgamation" into four companies (§§1, 2). The constituent companies may receive the new securities issued for their property and may hold them for not over ten years (§3). The "value on a net revenue earning basis" of each constituent company shall be considered together with "all the circumstances of the case" (§6). The consolidations are to go into effect on or before July 1, 1923, unless postponed by the "amalgamation tribunal" in which case the net receipts after that date are to be pooled and divided (§6). The amalgamation tribunal consists of three persons named in the Act and their successors appointed by the Crown, and such tribunal is made a "court of records." Appeals are allowed on questions of law (§9). The "Minister of Transport" may order common use of "facilities," rolling stock and plant, but such order shall first be considered by representatives of the railways and their experts (§16). Then there is to be a "rates tribunal" of three and it also is to be a court of record, the president to be an experienced lawyer, one member experienced in commercial affairs and the third in railway business (§20). In any particular case two more may be selected to act with the three, these two being selected, one from a body of 36 (22 named by the President of the Board of Trade; 12 by the Minister of Labor; 2 by the Minister of Agriculture) and the other from a body of 12, named by the Minister. Appeals are allowed on questions of law (§24). This tribunal may fix rates and classifications, based on the "aggregate net revenues" in 1913 plus 5 per cent on capital invested after that date or not remunerative until after that date, but less savings effected by the amalgamation up to one-third thereof (§58). If any company is carrying on any ancillary business, not subject to the Act the income therefrom or what it should be if proper charges were made is to be considered in fixing the railroad rates (§58). If at any time the net income is in excess of the "standard revenue of the company" under "efficient and economic management" the rates shall be reduced but not to exceed 80 per cent of the excess and

not to prejudice the financial position of any other company. The 20 per cent allowable increase may be cumulative. Likewise the rates may be increased to produce the standard revenue (§59). Then there are provisions for "Wages Boards" and "councils" of railroad officials and labor representatives. The "Central Board" shall consist of 8 each; the "National Wages Board" of 6 each. Wages, hours, etc., are to be "referred" to these Boards (§§62-67).

In England this Act of Parliament is a *fiat* and the railroads must obey. In that country no court can set aside an Act of Parliament as unconstitutional. In the United States our written Constitution very wisely controls Congress and hence courts may set aside unconstitutional Acts of Congress. In this country an Act of Congress, similar to the British Act, would be unconstitutional as depriving railroads of their property without due process of law; i.e. forcing the railroads to transfer their property to a consolidated company for stock and bonds of the latter, instead of condemning. Condemnation means an award in cash; payment cannot be made in stocks, bonds or other promise to pay in the future.

Hence in the United States the same result will have to be accomplished in a different way, if at all. One way is the way now being pursued, namely, voluntary consolidation, approved by the Interstate Commerce Commission. That way is slow and so far the results have been disappointing, owing largely to the effort to preserve competition as required by the Act of Congress.

Another way and the way which in the end will probably be adopted, will be this same English way to the extent of the incorporation by Congress of several railroad corporations; regional in their territory; non-competitive in rates and service; and authorized to issue stocks and bonds in exchange for existing stocks and bonds, on a basis to be approved by the Interstate Commerce Commission. The difficulty will be in inducing present stockholders and bondholders to exchange their holdings for the new stocks and bonds. The inducement will have to be not a greater return (because the public evidently will not sanction more than a very reasonable return), but greater assurance of reasonable dividends and of interest. There are those who go to the length of saying that the Government, having taken control of rates and wages, should now take control of and be responsible for dividends by allowing rates to be high enough to pay reasonable dividends; and that this can best be accomplished by organizing a Federal Railroad Board and giving it sole control over rates, wages and dividends; the last being made legal by having that Board elect the boards of directors of new federal railroad corporations, the stock of which shall be non-voting. This would place squarely on the Government the sole responsibility for fair rates, wages and dividends. If dividends were not paid the public would suffer from lack of facilities, due to unfair treatment of investors. You have exercised the powers; now take the responsibility.

Consolidations are at present blocked chiefly by insistence on competition in service. The English have frankly abandoned that theory and even the American public is slowly realizing that competition in service is waste and means duplicate trains, roundabout routes, terminal monopolies increasing terminal expenses of competitive lines, discriminations and secret rebates. When the *fetish* of competition is abandoned in this country, federal incorporation will come as the proper mode of consolidation. Practically all of the states are adopting the policy expressed by the New York Court of Appeals in 1912 when the court said (207 N. Y. 98, 99): "It is the settled policy of the State arising through an extended and instructive experience to withdraw the unrestricted right of competition between corporations occupying through special consents or franchises the public streets and places and supplying the public with their products or utilities which are well nigh necessities."

I fail to see why this same policy does not apply equally well to the railroads.

WILLIAM W. COOK.

Blacksmiths in Utopia and Brakemen in America

NEW YORK CITY

TO THE EDITOR:

The problem, in this industrial age, of cultivating true sympathetic loyalty in 100,000—or even in 5,000—railroad men is a tremendous one.

As the perplexities and the bigness of the task have so long baffled us, let us for a moment look at the question in miniature. Take the typical case of the village blacksmith and his two helpers. The helpers believe that they ought to have more pay. The boss sets out to convince them of the reasonableness of their present wages. First, they must be trained in the study of balance sheets, costs, competition, dull seasons and busy seasons, reserve funds, obsolescence of tools, and so on. For the boss to tell them the results of *his* study of these questions *is not enough*, unless they have complete confidence in his judgment, his honesty and his friendliness. In how many cases would this be true? Very few. The helpers ought to realize that a proprietor must maintain a little higher position in society than a journeyman, and that that costs money; how can he impart this truth? He desires a friendly attitude on the part of the workmen's wives; how can he assure himself of this, except by a very broad, friendly permanent policy? He must keep this up, year after year.

Assuming employees fully enlightened, how long will they remain so? The anthracite coal strike commission, 20 years ago, for which President Roosevelt was so greatly praised, did some of this enlightening, at great cost of time and money, and then was able to settle rates for only a short time—two years, if I remember correctly. In two years a good many of the men will forget all of the details.

In the settlement of complicated questions with large numbers of men there will always be one or more points that must be left unsettled; and the only way we— either employer or employee—are able to continue to live and get along comfortably is by accepting the partially unacceptable. One or both sides will accept less than it desires because, frankly, life is too short to get complete justice. But in doing that, all of us, high and low, feel our limitations. We lack the courage, or the brotherliness to make a little sacrifice. We preach independence, but cannot muster up the grit to take an independent stand. We want someone to lean on.

And the need, whether of the blacksmiths in Utopia or of the railroad men in America, is an arbitrator. I dislike to use that word, for it is only partially descriptive; but you have yourself used it, so I feel safe. As you have so well said, an arbitrator must be a man whose benevolence and uprightness are acknowledged by everybody; and he not only must issue final decisions but must be able to explain current details. The directors of the Pennsylvania Railroad (for example) should get someone else to tell the employees how fair and honest is the board they are working for. This is no reflection on the directors. A board of angels could not convince unwilling men, and there is always a lot of unwillingness in your men. Lincoln said that no man was big enough to own and boss a slave. No business man is big enough to be able to convince 5,000 employees of his fairness. It is not yet proved that even Henry Ford, paying men double what they earn, is loved by all his employees. A benevolent employer, here and there, makes friends by profit sharing, or by gifts, or by some special arrangement; but that is not business. The railroads have to submit to the hard and always pressing conditions of the business world. Our problem is to combine human interest with cold business; and we have no good example from which to take lessons except in businesses which, as compared with a big railroad, are almost childish in their smallness.

A writer in the *Railway Age,* not long ago, speaking of loyalty of employees, quoted the golden truth "your employee gives you faithful service *because he likes you.*" How little do we see of this in railroad shops! Every foreman ought to paste that maxim in his desk, in large letters. And the workman must like you for something more than mere money.

P. B. P.

Rattle the Chains

San Francisco.

To the Editor:

The letter of C. E. Parks in your issue of December 16, in which I am thoroughly dragged over the coals for my article of November 18, is decidedly interesting. Unless it be his too-enthusiastic use of quotation marks in quoting (paragraph 2) what I never wrote, I have no complaint against being pictured as the average, not overly intelligent, and unthinking shipper, and being left with my "disgruntled" confreres to stew in the vile broth of our own concoction, over-regulation.

Mr. Parks' angle is distinctly that of the doctrinaire, of the man who has given "10 years of intense reading and study" to the problem, as against that of the man who for a like period has been in daily contact with average rail practice. He is content to find in regulation the origin of all our present-day grief, while I am probing for a feasible path toward a solution.

No one can outdo me in my abomination of regulation in all its forms and details; a bare program of rates, not excessive and not discriminatory, would cover the ground and even this is probably unnecessary under modern business ethics. But to make regulation the sole cause of all the woes to which the roads have fallen heir is distinctly a picture out of focus.

The roads are still free in choosing and training their personnel and they have a wide and almost unexplored field in improving their relations with the public. Too many rail executives are reasonably content with regulation as they have it today. In effect their attitude is, "Well, we've worn these shackles quite a while now; we're comfortably calloused where they hang heaviest, and after all, while they slow us down enormously as compared to the man who doesn't wear them, still they are somewhat of a protection and we'll never go far wrong as long as we have them."

A strenuous rattling of the chains, a healthy roar of protest from executives, from the rank and file, and finally by contagion from the rail customers would help tremendously in relieving the roads from the more oppressive forms of regulation. Intelligent and absolutely legitimate publicity has never yet failed to right abuses and it is a weapon lying ready at hand. But today the roads are largely inarticulate, and—worse—they are out of sympathetic contact with their customers, the public at large.

We have the sorry spectacle of Capper's team-mate from Kansas and the newly elected ex-dentist senator from Wisconsin probably courting and certainly getting from reasonably conservative sources (Sunday Magazine, New York Times) wide publicity for their obviously puerile and probably malicious attacks on the roads. Yet the odds are 10 to one that the man who wrote this story of the economic nostrums so dear to the political hearts of these fledgling senators would have an exceedingly difficult task in gaining interviews with prominent rail executives to refute their views.

But when the roads collectively come to the realization that wide publicity given to their problems, that a clear and on occasion detailed statement of their difficulties, that a real effort toward intimate contact with their customers—that all these are in order, then they will be amazed and delighted to see how much they can accomplish and at what a trifling cost.

Winthrop Martin.

A Real Grievance

To the Editor:

I have been greatly interested in your editorials on the personnel problem. I believe it is a good thing and that now is the time for such a department to be started. I presume this would include some one to search out deeds that are deserving of mention and see that proper record is made on the discipline sheets of the various individuals.

On this road (Burlington) the Brown system of discipline is used. No actual time is served for offenses, but entries are made against the individual records from time to time until dismissal is warranted. I think the men believe it very fair. To offset these entries, however, someone should look up the good things the employees do and see that proper credit is given. I have in mind a conductor who was given an entry for failure to load some eggs; later, while this man was asleep in a way car, an icehouse nearby caught fire. He and the brakemen secured an engine from the roundhouse and pulled the cars away before any enginemen showed up. A small incident, perhaps, but with the egg entry fresh in his mind he told the superintendent about it and received that time worn answer that "it was your duty." For the lack of thanks this company has three men who now never hear an alarm when company property is in danger and they fail to see little things that could be righted easily. With such a department I am sure the conductor would have been given proper credit.

The recent strike has caused both the railroads, the employees who went out on the strike and those who did not, to do considerable thinking and wonder if there is not a better way to settle their misunderstandings. I believe such a feeling is finding fertile ground among train and engine employees. A similar display on the part of the railroads would help to spread it.

Good results—not only from the better feeling promoted, but actual returns on the money invested—could be obtained by providing suitable buildings at terminals equipped properly with railroad literature, air brake books, etc., and have them kept clean, not just swept out once a day. Roads that have the Railroad Y. M. C. A. are very fortunate. All the buildings I ever had to do with are small and dirty and everything inside in the same condition. These buildings should be large enough for use by all employees. In this way men would more likely spend their time in a more profitable way than is now done.

A good start was made on this division by having an annual picnic. It was well attended and everybody had a good time. A change to officials caused its abandonment.

A trainmaster talking before employees recently said he believed men should be praised for the good they did just as they are criticised for poor work. He is the only official I have heard make such a statement. "A little praise now and then is relished by the best of men." At least it does keep one in a spirit to always do his best.

Conductor.

Salesmanship and Service

Columbia, S. C.

To the Editor:

"Service is Prerequisite to Salesmanship"

The article on page 1039 of your December 2 issue and another article along the same lines on page 1223 of your December 30 issue, "Do American Railways Lack the Selling Sense?" both bring out some good points under the heading of salesmanship. I, however, wish to take exception to some of the conceptions as applying to all phases of the railroad organizations.

In the first place a salesman always appears in the

role of one offering something and in most cases there is of necessity some argument both pro and con when a salesman is trying to make a sale. The word and spirit that I would substitute for salesman is service courteously rendered —at the same time giving that personal touch which the world so much needs today.

To make myself a little more easily understood I will refer to some things which I know from experience can be done in handling the public—namely, train our employees to make each patron feel that his business is highly appreciated whether he be a $1.00 man or a $100,000 man. I would go farther and have each employee feel his responsibility in dealing with the public and that his future depends on how he gets along with those of our patrons whom he serves. Another reason why service should supplant salesmanship is if the services in all of its branches are made of a high standard of efficiency, then assuming that a salesman could be used I am sure he would have no trouble in making a "deal."

Judging from the sense of both the articles referred to it is evident that reference is made in part to selling tickets. It has been my observation that in ninety-nine cases out of a hundred when any one desires to make a trip they select the shortest and quickest route, and in the South especially there is a very small percentage of the traveling public that does not adhere strictly to this rule.

When it comes to routing freight business I am willing to concede here is an opportunity for salesmanship, but I do not believe that the most gifted salesman could cause a customer to route a car of freight against a railroad if the employees of such railroad had rendered him 100 per cent efficient courteous service.

If service is rendered in the proper spirit salesmanship will follow just as naturally as the noon-day follows the morn. Therefore, I reiterate, service is prerequisite to salesmanship.

W. F. Cooper,
Superintendent Terminals, Southern Railway System.

A Place To Begin To Improve

Pittsburgh, Pa.

To the Editor:

Why do not our railroads get down to fundamentals? To the disinterested observer it is exasperating to see the persistent opportunism in our boards of directors; their constant ignoring of the most vital issues and their calm dependence on Congress, the Interstate Commerce Commission and good luck. Through the instrumentality of the Association of Executives they have done somewhat better during the past few months; but there is still room for a great amount of constructive and humane thinking on the part of the men who really formulate the elementary features of our railroad policies—the board of directors.

The most vital issue today is the relation of employer and employee; or, as the common phrase has it, capital and labor. The railroads' greatest need is higher efficiency; more product per man. A great measure of improvement in this respect could be effected in short order if each man—or even each one of the permanent employees, say two-thirds of the whole —could be induced to do his best. The whole problem lies in the question of motive; the motive in the mind of the man, (not the *loco*-motive that runs on wheels). When men do as well as they know how, business runs smoothly and the rate of progress is astonishing. If the average man's "best" is today rather lower than could be wished, there is no question but that honest practice in carrying out a higher motive would soon improve him. You and other doctrinaires continually harp on improvement in detail (with but little effect); when, if you once get a man's ambition and honor and conscience aroused, the details will very largely take care of themselves.

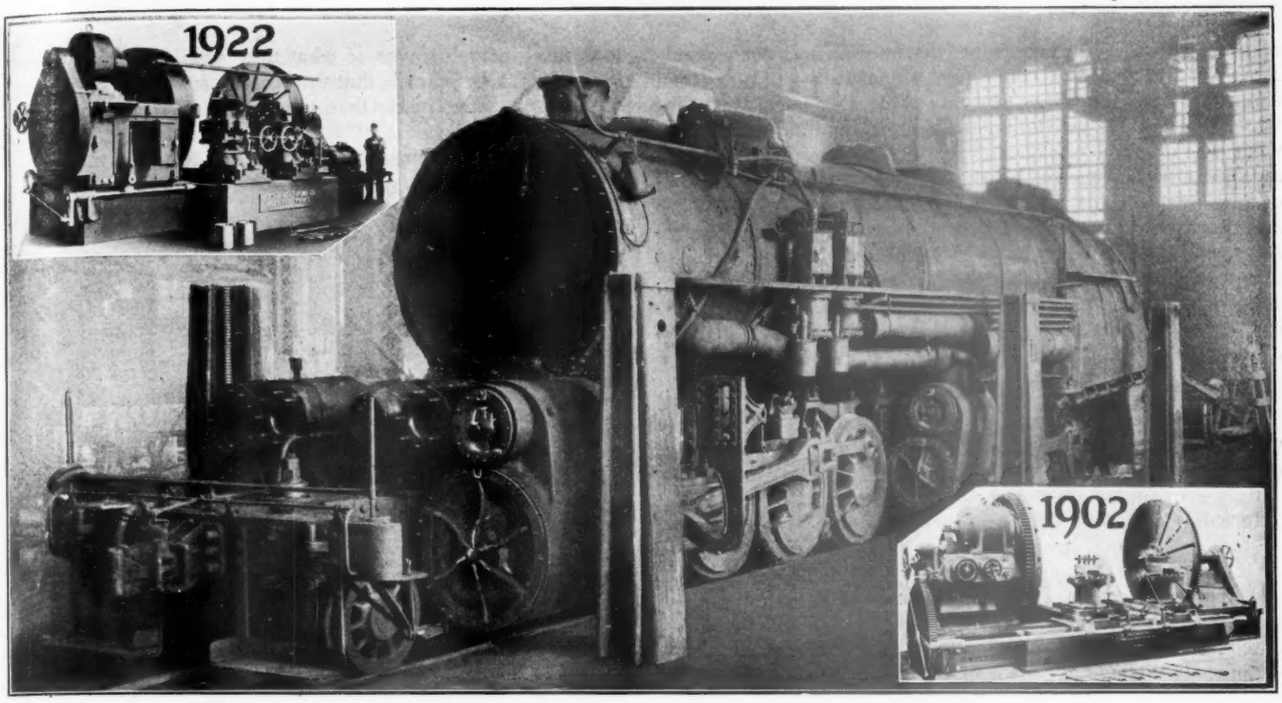
And there is a very simple way to go about this. I recall that back about 1890, when there was a grave situation on the Erie, resulting in an exceedingly narrow escape from a strike which would have tied up the whole system, an officer of the road said to me that not over 10 per cent of the men were disaffected; the other 90 per cent were simply followers. A large part of the 90 per cent were at heart loyal; and they aided the agitators only by their neutrality—they could have been turned to a course of positive loyalty by a very few leaders. And I have noticed a similar situation in every strike since then. The "outlaw" strike of 1920 was perhaps a little different, as the go-as-you-please customs engendered by the war-time conditions had set a good many men to thinking for themselves who had all their lives been followers; but the principle is deep-seated; a few can always lead the many; and they do lead them. Every railroad officer knows that the one essential of *good* relations between employer and employee is *intimate* relations. In other words, if the intercourse between officer and employee is regular and sufficient, it accomplishes its purpose.

The remedy for our present friction is almost too simple to need to be stated. It is inconceivable that, after a full and fair discussion, thoroughly understood by *all of the leading men on both sides,* our superintendents and trainmen could not reach an agreement on a peaceable mode of living; with both conductors and enginemen, yard and road, freight and passenger. With intelligent and earnest men in these leading classes, we should have only ourselves to blame if we did not, through them, keep the brakemen and firemen sane and reasonable. And I believe the same could be said of shopmen, if only the policy of shop operation could be always conservative and stable.

On a small division a superintendent and four trainmasters, if given a free hand and full authority, could work a noticeable change in one year. If you make sure that these officers are themselves honorable, frank and courageous; if, then you assure them of the company's backing for four or five years; and if you give them a sufficient untrammeled appropriation of money, (not for bribes or anything of that sort) so that in the beginning they can assure the employees of the real friendliness of the company, they can get hold of a good nucleus of leading employees and make friends of them.

They must, of course, seek to ingratiate themselves with *leading* employees. If the leaders are not the best men in your force, that is a condition that must be reckoned with. Do not evade the issue. The superintendent who throws up his hands because the chief of an employees' committee is not square, or is a little slippery, is too thin-skinned for the twentieth century. He should reflect on the frequency with which the brotherhood leaders can point to something done by a railroad company which, in their view, is not honorable. The fact that the company is not dishonorable does you no good unless you can make a little progress in getting the men to believe you when you say it. F. S. D.

The strike of shopmen on the Great Northern which began last July and involved more than 9,000 workers along the line was terminated on January 9, following a series of conferences between the operating officials of the railroad and representatives of the Brotherhood of Railway Trainmen and the Brotherhood of Locomotive Engineers. According to the understanding upon which the federated shop crafts called off the strike, the striking employes will return to work as new men but they will be taken back in the order of their old seniority and without affecting the seniority of new men employed since the strike began.



Can Modern Locomotives Be Repaired Economically With Machinery 20 Years Old?

Lack of Modern Machinery Handicaps Railroads

Net Earnings Are Reduced by Need of Machinery to Repair Equipment with Desired Speed and Economy

By E. L. Woodward

BROADLY SPEAKING, the machine equipment of railroad shops and enginehouses affects net earnings in two ways, and is therefore of interest to the highest executive as well as mechanical department officers. In the first place locomotive and car repair costs are bound to be excessive without sufficient heavy modern machinery, in proportion to the increased amount and size of equipment, to reduce labor costs to a minimum. Second, lack of machine facilities delays repair operations, holding equipment out of service in shops and enginehouses longer than would otherwise be necessary and cutting down revenue-earning hours. Shop machinery also represents an investment which, in the present state of railroad net earnings and credit, should be subject to the closest scrutiny by mechanical, purchasing and higher executive officers.

PRESENT machine equipment in railroad shops and enginehouses averages 20 years old. This machinery is deficient in amount, size, power and convenience of operation. It appreciably increases maintenance of equipment costs which, in 1921, were one and one-quarter billion dollars, or 23 per cent of railroad gross earnings. This article attempts to point out how serious the machine deficiency has become, what influences have brought it about, and what can be done to remedy it.

The vital importance of shop machinery is indicated by the fact that in almost every railroad shop the output is limited by that of the machine department. Usually this department is lacking in both space and modern machinery. The erecting, boiler and blacksmith shops can in most cases handle more locomotive parts a month by increasing the force, but the machine shop is equipped with a certain definite number of machines which absolutely limits the number of rods, links, driving boxes, or wheels it can repair. True, machine shop output can be increased by putting on extra shifts, but past experience has shown this practice to be generally costly and unsatisfactory. Attention has been focused on the deficiency of machines more strongly than ever before, as a result of the strike and present attempts to secure greater shop output. Higher railroad officers are coming to realize that modern machinery is essential to efficient shop operation, and money spent for it is more than an operating expense. It is an investment which often pays better than equal investments in rolling stock.

Modern machinery fulfills the same important function for the railroad as for other industries, and immense numbers of machine tools are used in 403 locomotive shops, 568 car shops and 3,271 roundhouses on Class I roads in the United States. Obviously, if any considerable proportion

of these machines is inefficient, the total loss is correspondingly great. Over 600,000 men are employed in railroad shops and roundhouses, and in 1921, the latest year for which figures are available, the cost of maintaining equipment was one and one-quarter billion dollars, or 23 per cent of all the money earned by the railroads. What proportion of this money could be saved by scrapping present obsolete and worn-out shop machinery and installing modern equipment would be hard to say. If only a fraction of one per cent was saved, however, the figures would still assume striking proportions. That important savings are possible is admitted by all unbiased observers familiar with actual shop conditions.

Present Machine Facilities Seriously Inadequate

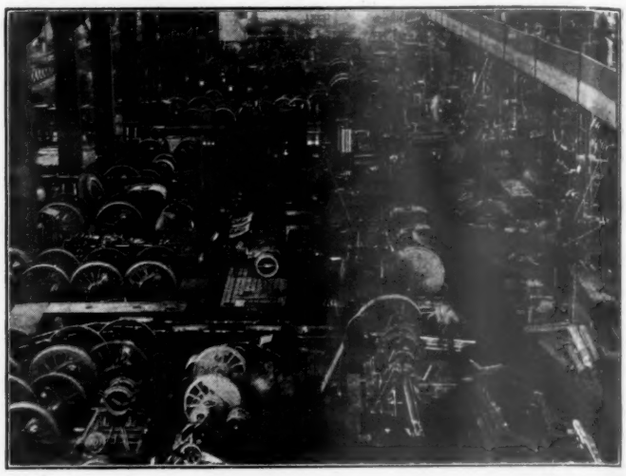
Perhaps present railroad machine tool needs can best be visualized by noting the relatively small amounts of money spent in recent years for replacing existing shop machinery and to provide for increased needs. The facts of the situation will be evident from a study of Table I, showing in column A, the total operating expenses of the railroads each year for five years; column B, the money spent in repairing and replacing present machine equipment; column C, the ratio of B to A; and column D, investments in machinery purchased to make up deficiencies and fill increased needs. A longer period is not shown in this table for the reason that additions and betterments chargeable to capital account, column D, were not compiled by the Interstate Commerce Commission previous to 1917, and the figures for 1921 and 1922 are not yet available.

TABLE I.—STATISTICS FOR CLASS I CARRIERS

For fiscal year ending	(A) Total operating expenses	(B) Account 302 shop machinery	(C) Per cent of total expenses =(B)÷(A)	(D) Additions and betterments to shop machinery
Dec. 31, 1917...	2,829,325,123	14,552,997	.514	6,372,825
Dec. 31, 1918...	3,948,132,200	27,520,000	.696	7,775,692
Dec. 31, 1919...	4,378,285,227	24,802,814	.569	11,384,145
Dec. 31, 1920...	5,830,620,492	29,662,306	.509	7,466,414
Dec. 31, 1921...	4,562,668,302	19,249,027	.422	.....

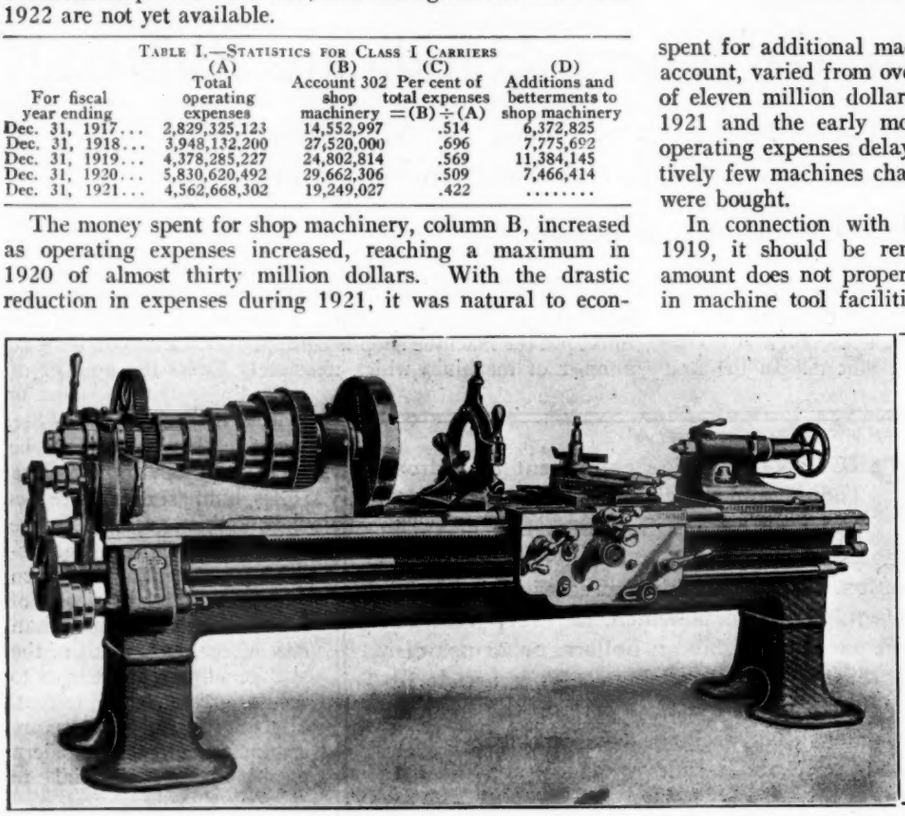
The money spent for shop machinery, column B, increased as operating expenses increased, reaching a maximum in 1920 of almost thirty million dollars. With the drastic reduction in expenses during 1921, it was natural to economize as far as possible on shop expense and Account 302 was reduced ten million dollars, or practically one-third. It was not only reduced but its proportion to the total operating expenses reached the record low point of .422, as shown in column C. This economy in shop machinery maintenance may have been, and probably was, necessary at the time, but it is merely a deferred expense which must be made up in the future. It is indicative of the general tendency to overlook machinery in favor of what may seem to be more pressing needs. Our point is that these needs have been overlooked so long on some roads that there are practically no needs more pressing.

Referring to column D, it will be noted that the money spent for additional machine facilities, chargeable to capital account, varied from over six million in 1917 to a maximum of eleven million dollars in 1919, then falling off. During 1921 and the early months of 1922, the retrenchments in operating expenses delayed betterment programs so that relatively few machines chargeable to additions and betterments were bought.



Congested Heavy Machinery Bay—The Average Railroad Machine Shop Is Lacking in Both Space and Modern Labor-Saving Machinery

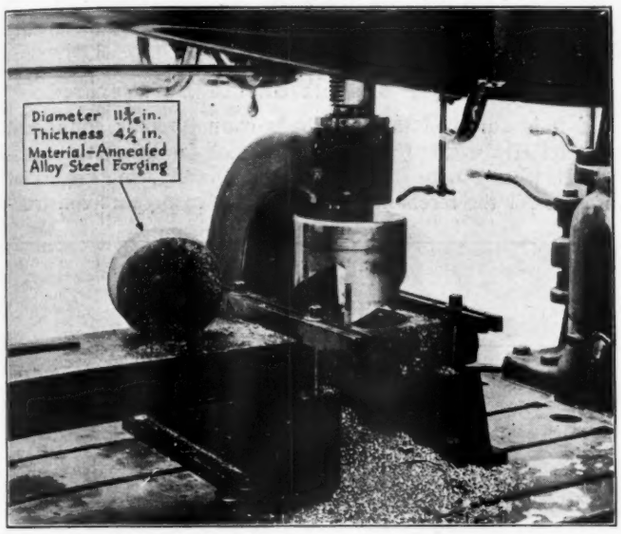
In connection with the eleven million dollars spent in 1919, it should be remembered that this unusually large amount does not properly represent a proportionate increase in machine tool facilities. Machine prices were then near their high peak and probably the number of machines actually secured did not greatly exceed those bought in 1917 for about one-half the price. It is certain that railroad investments in machinery in recent years have been insufficient to much more than maintain existing facilities, let alone make up past deficiencies, or provide normal expansion to care for the increasing number of heavier cars and locomotives.



While capable of many years more service, this machine is so inferior in productive capacity to the modern engine lathe that it can be used economically only in small shops and engine houses having few turning operations daily. Other standard tools, like drills, planers and milling machines, 20 years old, are even more inefficient compared to modern tools.

Common Type of 20-In. Cone-Driven, Back-Geared Engine Lathe, Built About 1902

The poor condition on many railroads as regards shop machinery is also indicated by the number of machine tool programs which have been entirely cancelled or carried out only partially. Attention was recently directed in the columns of the *Railway Age* (page 826, November 4 issue) to a definite case where a railroad having four moderate-sized repair shops made an exhaustive study of its machine tool needs, and outlined a program calling for an expenditure of $275,000 a year for ten years. This program was



Side Rod Bushing Hole Roughed Out in 23 Minutes on a Modern Radial Drill. What Manufacturer 20 Years Ago Would Have Dreamed of Attempting Such a Job?

initiated over two years ago and, owing to financial limitations, three machines only have been purchased in the interim.

There are men who say by inference, if not in so many words, that railroad shops do not need the highest type of modern machine tools; that railroads always have got along with more or less inferior tools, and always can. There is just enough truth in these statements so that they cannot be branded as absolutely false. For the majority of machining operations, highly specialized productive tools are not needed. That does not mean, however, that so simple a tool as a lathe should not have ample power, rigidity and ease of operation. Modern lathes are sufficiently superior in these respects to many of the lathes now used in railroad shops to enable them to effect savings which will more than pay carrying charges on the additional investment.

Machines 20 Years Old Cannot Push High Speed Tools to Capacity

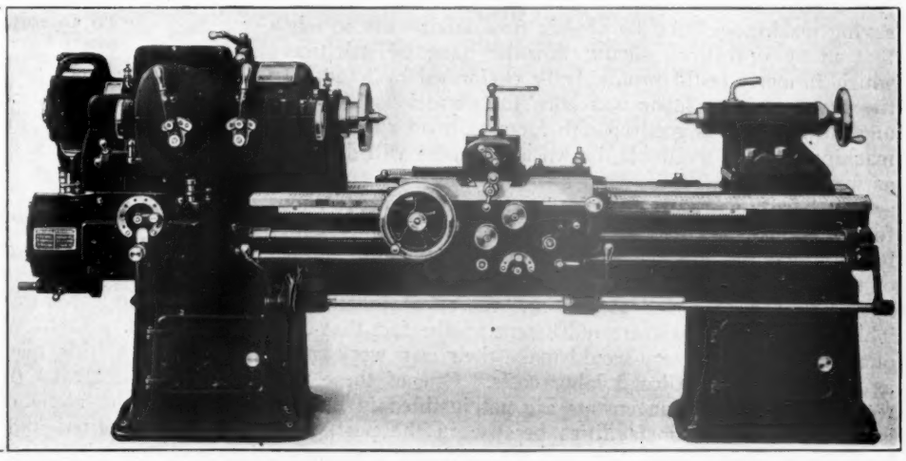
The condition of present machinery can also be appreciated from the fact that the average age of machine tools in the largest shop of an eastern railroad is 15 years. On two southern roads the machines average over 19 years old in each case. Unquestionably, even the simplest types of standard machines, such as lathes, planers, shapers, milling machines, drills, etc., have been improved so much in design during that period that railroads cannot afford to operate the older machines, except possibly at small isolated points where they will be used only two or three times a day.

Not only is the old machinery inadequate in amount, power and convenience of operation, but also in size, being totally unsuited to handle the heavy parts entering into modern locomotive and car construction. During the past ten years alone cars have increased 11 per cent in number; locomotives have increased 40 per cent in number and 50 per cent in tractive power. Have machine facilities been increased proportionately?

In many shops the tremendous possibilities of high-speed steel in cutting the cost of machine operations cannot be realized because the machinery lacks sufficient power to work these tools. In a recent specific case, a new high-speed tool was being tried out in a shop of one of the most prosperous roads in this country. Except for the wheel lathes, no machine was found in the shop capable of pushing this tool to anywhere near its capacity. The tool was adaptable to use on lathes, planers, shapers, or slotters, and was first tried on a small planer of ancient design, machining a driving box wedge. The lack of rigidity of the planer drive was such that the speed or feed could not be increased without violent chattering. The tool head had at least 3/32 in. lost motion back and forth on the cross feed screw, and was observed to spring back that amount after the completion of each cut. Sometimes considerable material has to be removed from the faces of shoes and wedges, and, with a planer of this type and present high machinist's wages, the cost of the operation is excessive.

The tool was next tested on a lathe which apparently was far older than the shop in which it was installed. This lathe was driven from a countershaft and pulley, on which the belt slipped every time an attempt was made to increase the feed or speed. The back gear shaft on this lathe was observed to have fully ⅛ in. play in its bearings and the result on power delivered at low speed can readily be

This modern lathe will work high speed steel tools to the limit, taking heavy cuts with accuracy and speed. Selective speed and feed changes are almost instantly obtainable. The main spindle can be started, stopped or reversed by either of two easily-reached levers. Wherever sufficient work is available this machine will show important savings over older types of lathes.



1922 Model, 20-In. Motor-Driven Engine Lathe—a Compact, Powerful, High-Production Tool

imagined. Unfortunately, such machines are not the exception but can be found in large or small numbers in almost every railroad shop in the country.

Reasons Underlying Present Machine Deficiency

As has been pointed out in these columns before, the small annual net earnings of the railroads in recent years has discouraged investors, so that capital needed to expand the railroad plant in proportion to the normal expansion of business could not be obtained. It has been difficult to get new equipment and even more difficult to secure the repair facilities needed to maintain new equipment. This explains why in many cases railroad shops and enginehouses are equipped as at present with so many machines which are antiquated, inefficient and costly to operate.

Another important reason is that mechanical department men have taken old machinery too much for granted, either entirely failing to show the managements how much money could be saved by the installation of modern equipment or else becoming discouraged after once pointing out the needs and getting no action. Many progressive mechanical department men on the other hand do realize the savings possible by new equipment, but their hands are completely tied by the financial inability of the railroads to provide the appropriations needed.

The comparative ease of getting money for new rolling stock as against new machinery has also operated to the disadvantage of the latter. In fact the difficulty in getting even small appropriations for machine tools has been so great that railroad men will patch, repair, weld in gear teeth, and frequently manufacture complete new tools in the shops, charging them to operating expense. Some shopmen take an almost unholy pride in their ability to devise ingenious makeshifts for some standard machine which could more profitably be bought. The expense of constructing these makeshifts in railroad shops is excessive and they are relatively unsatisfactory in operation.

Effect of Modern High Labor Costs

Another explanation of the generally poor condition of railroad shop machinery is that no longer than ten years ago, labor costs were fully 50 per cent less than now, and it was not relatively of as great importance to utilize labor-saving machinery. At the present time labor costs so much that many operations should now be done by machinery which formerly could profitably be performed by hand. In the days of cheap labor was born the pernicious idea that any old machine is good enough for a railroad shop, and if machines are not available, brawn and muscle will do about as well.

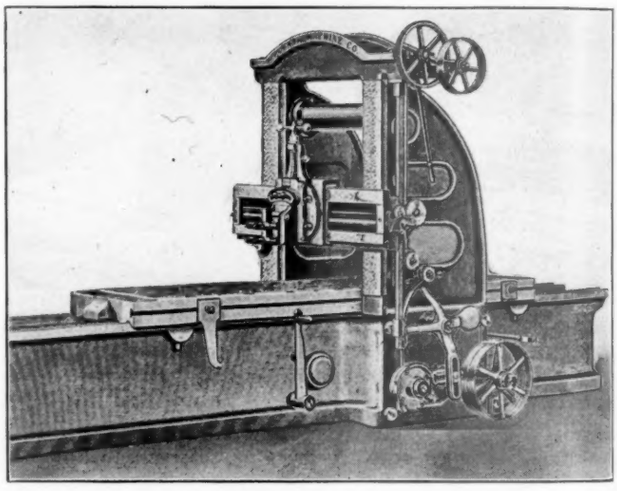
It is hardly necessary to defend the need of railroad shops for more and better machine tools, and such a defense would be absolutely unnecessary were it not that some railroad men of the old school have always got along with the old equipment and seem satisfied to continue the effort indefinitely. They forget, or at least are indifferent to, the fact that adequate modern machinery would make their own work easier as well as reduce railroad labor costs. One of these men recently said that managements are not justified in making large expenditures for facilities because in the past, peak loads have always been handled with existing equipment. True, each peak was handled after a fashion, but it is a question how successfully and how economically it was handled. In practically every case revenue was lost, perishables damaged while waiting shipment and, in the rush to get equipment through repair shops, costs were excessive.

There may be no justification for a plant and equipment able to handle with ease the peak load in any business. The plant should be available, however, to handle peak loads with a reasonable degree of efficiency and economy. That railroad equipment is not now in the latter happy condition is indicated by Secretary Hoover's recent statement that car shortage each year costs the general public (and the railroads) as much as the entire annual cost of administering the affairs of the federal government. One important reason for car shortages is lack of machinery and equipment for rapidly repairing cars, particularly steel cars.

It is not maintained that every railroad shop should be equipped with the latest types of modern productive machinery, but these machines should be installed wherever the volume of work warrants. Rugged standard types are needed elsewhere, and the best place for obsolete models, which waste valuable space and operator's time, is undoubtedly the scrap pile.

Machine Tool Budgets Should Be Prepared

If it is admitted that railroads cannot repair equipment satisfactorily with present machine tool facilities, the question is, what can be done about it? Plainly, one important thing is for the mechanical departments to prepare construc-



1902 Model Planer. Many Planers in Railroad Shops Are Older Than This Machine. They Lack the Power, Rigidity and Flexibility of Modern Planers and Are Costly To Operate on Production Work

tive machine tool programs, or budgets, based on accurate figures showing the cost of new machinery, the volume of work to be handled, and anticipated savings.

In establishing a budget for a certain road it was estimated recently that twenty thousand dollars per thousand miles of track should be spent annually for shop machinery. It seems more logical, however, to base machinery purchases on locomotive equipment rather than mileage. This road is approximately 8,000 miles long, with 1,600 locomotives, and shop machinery having a present replacement value of $3,200,000. From a basis of normal deterioration and obsolescence, this machinery cannot be considered to have a useful life greater than 20 years and in order to maintain the plant, let alone care for increasing needs, 5 per cent should be retired and replaced annually. This means an expenditure of $160,000 per year, or $100 per locomotive per year. As a matter of fact, this road spent $400,000 in 1920 for machinery when prices were high. Had a scientific budget previously been in force, the railroad would have saved considerable money, inasmuch as it would not have been necessary to buy so much machinery at the prevailing high prices.

Improved Purchasing Methods Needed

There is opportunity for a great improvement in railroad methods of purchasing machine tools, and timely editorials

on this, and general machine tool subjects, have been printed during the past year in the *Railway Age* as shown in the following table:

MACHINE TOOL EDITORIALS IN THE RAILWAY AGE

The Neglected Engine Lathe	Mar. 25, 1922
Show the Boss	April 1, 1922
The Wheel Lathe a Barometer of Shop Efficiency	April 22, 1922
Specialized vs. Wide-Range Machines	April 29, 1922
How Low Should Machine Tool Prices Go?	May 13, 1922
Car Wheel Grinding Effects Savings	May 20, 1922
Possibilities of High Speed Tools Not Realized	May 27, 1922
The Ultimate Cost of Poor Tools	June 3, 1922
Forging Machines Demonstrate Value	June 16, 1922
Increased Use of Grinding Machines	June 17, 1922
Machine Equipment for Engine Terminals	June 19, 1922
Have Planers Outlived Their Usefulness?	June 20, 1922
Milling a Production Machine Operation	June 21, 1922
Must a Machine Tool be Operated Continuously?	June 21, 1922
A Word for and to Purchasing Agents	July 1, 1922
Back Up the Tool Committees	July 8, 1922
Cost of Selling Machines to Railroads	July 15, 1922
Piecemeal Ordering	Aug. 5, 1922
Avoiding Mechanical Ruts	Aug. 12, 1922
Is Your Oil Burning Equipment Efficient?	Aug. 19, 1922
Are Modern Machine Methods Fully Utilized?	Aug. 26, 1922
Poor Tools Always a Handicap	Sept. 2, 1922
Use of Antiquated Machinery Justified—Sometimes	Sept. 16, 1922
A Lost Opportunity	Sept. 23, 1922
Haggling Over Material Prices Does Not Pay	Sept. 30, 1922
Manufacturers Offer Valuable Engineering Service	Oct. 7, 1922
Three Machine Option Criticized	Oct. 21, 1922
Lump Buying of Machine Tools	Oct. 28, 1922
A Constructive Machine Tool Program—Its Fate	Nov. 4, 1922
Brand versus Analysis Buying of Tool Steel	Dec. 2, 1922
Care Needed in Buying Used Machinery	Nov. 18, 1922

Railroad methods of purchasing machine tools have been criticized in three ways and with some justification. These include lump buying, the three-machine option and placing too much emphasis on price as opposed to quality. A railroad machine tool is an investment in which first cost is entirely secondary to the amount and kind of service rendered. With the present competition in the machine tool industry, price is a fairly accurate measure of serviceability and, since machine tools are used 15 or 20 years or more, productive capacity is far more important than first cost. The present practice of placing big shop equipment orders with one large manufacturer or dealer is objectionable because no one dealer represents all the best lines in the country and, in order to quote a lump sum lower than the total aggregate bid, he must include some machines not of the first quality. Considering machine tools as an investment, each one should receive separate consideration and be purchased in accordance with the individual needs.

Regarding the common practice of requiring the mechanical department to specify at least three makes of each type of machine tool desired, the objection to this practice is that any tool with outstanding features, or superior quality, is apt to have a somewhat higher price. Although the difference in performance may pay many times over for the comparatively slight difference of first cost, the purchasing department has no means of gaging the value of such differences and so places the order for the cheapest of the three tools pronounced acceptable. Unless mechanical departments have the privilege of specifying a particular make of tool, provided the difference of price is no more than a fair differential over the next best machine in the class, the railroads will rarely get the most efficient tools but will receive only the second or third best. Furthermore, they are apt to pay more than the inferior tools are really worth.

In large repair shops and enginehouses where productive capacity is of first importance, the high-duty machine is a paying investment at any price within reason. It is not maintained that in relatively small shops and terminals modern machines of the most improved type are needed. The solution of the problem is to leave the selection of machines in the hands of the mechanical department. Knowing the appropriations available and being responsible for maintenance of equipment costs, the mechanical department should not be debarred from specifying the best machine of a given type on the market if it feels that conditions warrant such action.

The arguments presented above hold also for the purchase of second-hand machines. The objections to second-hand machinery are that the first and best use has generally been obtained, and it is difficult to detect worn or defective parts. The railroads already have enough worn-out machinery in repair shops and enginehouses without installing machines which have already given their best service. Second-hand machinery should be purchased only with the greatest care, after a thorough detailed inspection.

Conclusion

It is vital that railroad executives and mechanical officers should appreciate more fully the present deficiency of shop machinery. Comprehensive machine tool programs, based on accurate cost figures and taking into account all overhead charges, should be prepared and presented to the managements in a concrete, readily understood form. With persistent effort along this line, the results in improved machine equipment of railroad shops will soon be evident, resulting in important reductions of maintenance-of-equipment costs.

I. C. C. to Investigate Efficiency and Economy of Management

ANOTHER investigation of far-reaching importance, involving the efficiency and economy of management of common carriers, was announced by the Interstate Commerce Commission on January 11, pursuant to an order entered on January 9, Docket No. 14,556.

"Sections 12 and 15 (a) of the interstate commerce act being under consideration, and the commission desiring to know whether expenditures of carriers by railroad subject to the act for the maintenance of equipment have been reasonable, and to keep informed as to the manner and method in which the business of such carriers is conducted with especial reference to the furnishing of car service, and to have full and complete information necessary to perform its duties; and having under consideration the question as to the efficiency and economy of management of such carriers; with a view to making such order or orders as may be appropriate under the interstate commerce act" it was ordered that the commission, on its own motion and without formal pleading, enter upon a proceeding of inquiry and investigation into and concerning:

(a) whether expenditures by such carriers for the maintenance of equipment have been reasonable;

(b) the manner and method in which the business of such carriers is conducted with especial reference to the furnishing of "car service"; and,

(c) whether the courses adopted by such carriers in the maintenance of equipment and in providing "car service" have been efficient and economical, and whether the service provided has been reasonably adequate.

All common carriers by railroad subject to the interstate commerce act were made respondents to this proceeding, and it was assigned for hearing at such times and places as the commission may hereafter direct.

The Section 12 of the interstate commerce act referred to, authorizes the commission "to inquire into the management of the business of all common carriers subject to this act" and directs it to "keep itself informed as to the manner and method in which the same is conducted." Section 15-a is the one which directs the commission to so adjust rates that the carriers will "under honest, efficient and economical management and reasonable expenditures for maintenance" earn a net railway operating income equal as nearly as may be to a fair return.

Group Life Insurance on the L. & N. E.

THE LEHIGH & NEW ENGLAND RAILROAD announced on January 1 to the supervisory and clerical employees of the road that the company had made a contract with the Aetna Life Insurance Company, of Hartford, Conn., for group insurance, to cover life and total disability, for the benefit of these employees; and Vice-President Rollin H. Wilbur advises that the plan has already been accepted by a sufficient number of employees to put it into effect; that is, to comply with legal requirements as to the necessary percentage of each class of employees.

The number of persons on the Lehigh & New England eligible for admission to the insurance plan is 358, including executives and officers of all departments; trainmasters, yardmasters, dispatchers, foremen, supervisors, storekeepers, agents, weighmasters, special agents, traveling firemen, traveling engineers, engineering department engineers and employees, all clerical forces, including agents' clerks, car checkers, freight checkers, yard clerks, transfer clerks, engine dispatchers, telegraphers and towermen.

The amount of insurance is graduated by length of service and by the amount of the employee's salary. For example, one receiving $200 a month and who has been in the service over four years, will be insured for $1,750; one receiving $150 a month and the same length of service, $1,200; one receiving over $250 a month and having been in the service 10 years will be insured for $5,000. The minimum, for an employee in the service one year and receiving less than $150 a month, is $1,000. The cost to the employee is 60 cents a month for each $1,000 of insurance. No medical examination is required. Employees temporarily furloughed through no fault of their own, or who lie off on account of illness, may have the insurance continued. The insurance is one-year renewable, group life insurance, and is subject to change or cancellation at the discretion of the railroad company.

The circular of the Delaware & Hudson Company, giving free life insurance to employees, was published in the *Railway Age* of January 14, 1922, page 182; and the plan of the New York, New Haven & Hartford for insurance for the benefit of supervisory and subordinate officers in the transportation, mechanical and maintenance-of-way departments of that road, was noticed in the *Railway Age* of September 16 last, page 501. On the New Haven the number eligible under the offer was 2,596, and of these 2,568 accepted.

Freight Car Loading

WASHINGTON, D. C.

FREIGHT CAR LOADING during the week ended January 6, which included the New Year's Day holiday, totaled 770,303, which was an increase of 170,870 as compared with the corresponding week of last year, and an increase of 72,662 as compared with the corresponding week of 1921. The loading was heavier by 60,000 than during the preceding week, which included the Christmas holiday, and the loading was, therefore, heavy for the season of the year, as it has been for some time. Increases as compared with the corresponding weeks of last year were shown in the loading of all classes of commodities and in all districts. Coal loading exceeded that for the corresponding week of the year before by 52,000 cars and there was also an increase of 66,000 in the loading of miscellaneous freight.

The freight car shortage was reduced during the week ended December 31 to 82,927 cars, including 38,397 box cars and 36,525 coal cars. There were also surpluses amounting to 14,981.

Freight traffic in November was the heaviest for that month in history, according to reports compiled by the Bureau of Railway Economics, amounting to 38,046,185,000 net ton-miles, an increase of slightly more than 30 per cent over the same month in 1921, and an increase of 2 per cent over the same month in 1920.

For the period January 1 to January 7, the car shortage was further reduced to 73,285, including 29,154 box cars and 34,243 coal cars, while the surplus had increased to 20,426.

REVENUE FREIGHT LOADED

SUMMARY—ALL DISTRICTS, COMPARISON OF TOTALS THIS YEAR, LAST YEAR, TWO YEARS AGO. WEEK ENDED SATURDAY, JANUARY 6, 1923

Districts	Year	Grain and grain products	Live stock	Coal	Coke	Forest products	Ore	Mdse. L. C. L.	Miscellaneous	Total revenue freight loaded	Corresponding period	
										1923	1922	1921
Eastern	1923	8,195	3,285	55,249	2,667	5,102	1,458	49,976	64,533	190,465	.....	.....
	1922	6,385	2,571	32,809	1,635	4,260	785	47,673	48,725	.....	144,843	158,365
Allegheny	1923	3,335	2,815	53,284	6,821	3,163	2,801	37,589	57,838	167,646	.....	.....
	1922	2,875	2,754	38,211	3,340	2,376	948	33,840	37,782	.....	122,126	149,908
Pocahontas	1923	189	61	17,490	532	1,100	163	4,980	2,793	27,308	.....	.....
	1922	304	69	17,200	197	869	26	4,341	2,341	.....	25,347	33,025
Southern	1923	3,252	2,214	23,708	1,103	18,824	1,483	31,210	34,240	116,036	.....	.....
	1922	3,483	1,993	18,352	400	13,002	488	29,116	26,466	.....	93,300	101,932
Northwestern	1923	14,352	9,923	9,806	1,345	15,171	937	20,221	24,719	96,474	.....	.....
	1922	12,317	7,471	8,103	974	10,710	309	19,127	16,747	.....	75,758	87,498
Central Western	1923	11,491	11,051	22,141	412	5,542	2,450	25,546	35,273	113,906	.....	.....
	1922	10,612	8,407	17,602	218	3,746	784	24,018	24,631	.....	90,018	109,717
Southwestern	1923	4,684	2,337	6,068	148	8,628	424	13,318	22,861	58,468	.....	.....
	1922	4,049	1,952	3,245	108	5,747	691	13,043	19,206	.....	48,041	57,196
Total West. Dists	1923	30,527	23,311	38,015	1,905	29,341	3,811	59,085	82,853	268,848	.....	.....
	1922	26,978	17,830	28,950	1,300	20,203	1,784	56,188	60,584	.....	213,817	254,411
Total all roads	1923	45,498	31,686	187,746	13,028	57,530	9,718	182,840	242,257	770,330	.....	.....
	1922	40,025	25,217	135,522	6,872	40,710	4,031	171,158	175,898	.....	599,433	.....
	1921	39,088	31,127	191,233	10,871	41,402	9,456	168,249	206,215	.....	.....	697,641
Increase compared	1922	5,473	6,469	52,224	6,156	16,820	5,687	11,682	66,359	170,870	.....	.....
Decrease compared	1922	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Increase compared	1921	6,410	559	.....	2,157	16,128	262	14,591	36,042	72,662	.....	.....
Decrease compared	1921	.....	.....	3,487	.....	.....	.....	.....	.....	.....	.....	.....
Jan. 6	1923	45,498	31,686	187,746	13,028	57,530	9,718	182,840	242,257	770,303	599,433	697,641
Dec. 30	1922	45,931	26,188	173,378	12,108	44,913	8,175	177,624	222,883	711,200	528,556	602,368
Dec. 23	1922	50,802	30,934	181,325	13,243	58,696	8,941	217,256	273,394	834,591	666,605	648,406
Dec. 16	1922	51,004	39,148	198,510	13,226	60,102	10,748	224,460	290,884	888,082	726,074	802,271
Dec. 9	1922	55,608	38,170	200,505	13,051	63,195	9,879	228,392	311,028	919,828	741,341	837,953

Compiled by the Car Service Division of the American Railway Association.

Commission Finds Coal Industry Overdeveloped

Too Many Mines and Miners and Irregularity of Demand Fundamental Causes of Instability

WASHINGTON, D. C.

THAT OVERDEVELOPMENT of the coal mining industry and irregularity of the demand for coal are the fundamental causes for its instability, underlying the immediate causes of periods of scarcity and high prices—labor difficulties and transportation deficiency—is the conclusion reached by the United States Coal Commission in its preliminary report submitted to Congress on January 15, as it was directed to do by the law creating it. The commission, of which John Hayes Hammond is chairman, does not attempt to express its views or recommendations at this time upon the controversial questions involved in its investigation of the coal business, one of which it says is "whether there should be cars sufficient to supply the needs of the whole country at a peak demand," but it has endeavored to confine itself in this report to giving the facts and expressing its opinions only after complete investigation and deliberate thought.

To acquaint itself with the phases of the industry it has devoted much time to conferences with and has received reports from representative mine operators, officials of the miners' union, wholesalers, retailers, experts on transportation and storage of coal and committees representing the railroad and public utilities. While much of the report is devoted to a discussion of the problem of "car shortage" the commission indicates a clear recognition of the fact that inadequacy of transportation is not the fundamental problem but is relative to the irregularity in the demand for coal and that in times of shortage a 100 per cent car supply based on the present mine ratings would create both a car surplus and a coal surplus.

The report says that the coal industry "in reality includes three interrelated industries—mining, transportation and marketing," and after pointing out that railroads consume 28 per cent of the bituminous output, it shows the close interdependence between the railroads and the coal business by saying:

"Because the railroads are the largest customers of the bituminous industry, and because coal—anthracite and bituminous—constitutes one-third of the railroads' freight the problems of the two are closely interwoven and their interests interdependent. Not only does irregularity in coal output mean serious fluctuations in revenue but excessive irregularity imposes impossible traffic demands on the railroads. On the other hand, interference with rail transportation means a corresponding stoppage of output for the mines and shortage of fuel for the consumer. No solution of the coal problem can be found that does not recognize this community of interest between coal and transportation. But this community of interest, though simply stated, is not simple upon examination. The movement of coal by rail and water is complicated by variations in freight rates, arbitrary differentials, and competition between different coals and between carriers.

"Combined charges of the railroad, the wholesaler, and the retailer in most localities exceed the price of the coal at the mines. Therefore it is readily seen that the problem whether the transportation and marketing charges are just and fair is of the utmost concern to the consumers of coal.

"The widespread public dissatisfaction with the service rendered by the coal industry is not confined to matters of shortage and price, for a train of unfortunate consequences has followed those recurring periods of scarcity: Deterioration in the quality of fuel delivered; congestion of railway traffic, necessitating the neglect of other freight to give preference to coal, to the serious harm of other business; and breakdown of mutual confidence of producers and consumers of coal as expressed in the customary contractual relations.

"There are certain mines which contract a part of their potential output, reserving the balance for spot coal. These operators guard themselves against car shortage by clauses which compel them to fill their contracts only in proportion to the relative car supply. So in recent years, when speculators with contracts could get only a partial supply of cars, say 60 per cent, they would use only that percentage of available cars for deliveries upon their contracts, while the other cars would be used for spot coal; that is, they prorate their contracts with the sole purpose of having free coal for a higher spot market.

"The record of production and distribution of coal in recent years may be summed up in the word 'instability,' and this instability in the supply of one of the most fundamental of all raw materials has been an important cause in unsettling business and in delaying the return of normal times."

After a discussion of labor difficulties the report also says:

"When work was resumed and the mines were once more turning out their product, it was found that the increased output could not be distributed apace with production, for the effect of one cessation of labor was not so quickly remedied as the other, and not even yet has the transportation equipment been restored to its former condition. With the shortage of coal and lack of railway facilities the fall season opened with general bidding for the supply on hand. Prices were forced up with the obvious effect on the public."

Car Shortage

Under the head of "Car Shortage," the report says:

"An opinion commonly expressed before the commission is that the primary cause of scarcity and high prices of coal is transportation deficiency.

"There have been recurring periods of car shortage, and such periods have generally been accompanied by high prices of coal. There are many other causes for the inadequacy of transportation beside the absence of cars, such as lack of motive power, congestion of yards, terminal facilities, or gateways, single tracks where double tracks are needed, inability to co-ordinate movement of boats and cars at ports, strikes of railway labor, and severe winter storms temporarily blockading traffic. Any one of these elements may be responsible for what to the operator at a mine seems a simple shortage of cars.

"Car shortage occurred at intervals before the war, but since 1916 it has appeared more frequently and for longer periods, and its effects upon prices and coal supply have been more serious. This increase in transportation disability as a factor interfering with the movement of coal is in part due to the depreciation of equipment under the strain of war and labor complications. This important subject—inadequacy of railroad equipment—is under careful study by the Interstate Commerce Commission as well as by this commission, and it is hoped that definite findings and recommendations can be made later.

"The so-called car shortage is not always due to insufficient coal-carrying equipment alone. In part it has been due to an overload upon the transportation system beyond what that system could reasonably or properly be expected to bear. The period of coal shortage and high prices from the middle of 1916 to March, 1918, was marked by almost

continuous complaint of lack of cars at the mines. But the volume of traffic thrown upon the roads as a result of the war exceeded anything in their previous history, and when by the summer of 1918 adequate preparation had been made to handle the traffic all current requirements for coal were met and an unprecedented surplus accumulated in storage.

Overloads Placed on Railroads

"In the next period of shortage—November, 1919, to late 1920—the roads were called upon to make up for six weeks' stoppage in coal production caused by a nation-wide miners' strike. On November 1, 1919, the union bituminous miners stopped work, and when they resumed, on December 13, the movement of coal was 26,000,000 tons behind the previous year. The railroads were then asked to make up the deficit and to do it on top of the regular current movement of coal and other freight. The extra load came at a time when the export business in coal was unprecedented and when general business was booming. Even so, the railroads could probably have met the demand had it not been for the severe storms of that winter and the switchmen's strike of the following spring. As it was, they established a new record for total volume of traffic handled, and by the end of 1920 the deficit in coal supply had been overcome and the price was again normal.

"Since the resumption of work, in August, 1922, after five months' cessation, more bituminous coal has been offered for shipment than the railroads have been able to carry, but only by investing money in a transportation system vastly in excess of reasonable requirements may the people of the country expect the railroads to make up within a few weeks the consequences of the five months' suspension of a large part of the coal mining.

"At the beginning of 1923 the bituminous coal industry presents to the country its usual contradictions. The one complaint common to most of the coal mining territory is that of car shortage; yet the outstanding fact is that in spite of a miner's election day and the Christmas holidays, these coal mines produced in December, 1922, over 46,000,000 tons of soft coal. An actual shortage of anthracite has kept domestic consumers on the verge of a buyer's panic, restrained only by the co-operation of the larger coal operators with the federal and state fuel distributors, yet the 46,000,000 tons of soft coal was probably sufficient for the country's needs for current consumption, even in December, if evenly distributed. The fact that low coal reserves in the hands of the consumers are not being rapidly replenished doubtless adds to the fear of scarcity, yet a full-car-supply for the country's soft coal mines, as rated by the railroads, would have furnished transportation in December for more than 75,000,000 tons or 20,000,000 tons more than the country ever took from the mines in a single month. Plainly, 100 per cent car supply, as based on such inflated ratings, would create a car surplus or a coal surplus far beyond the ability of the market to absorb."

Discussing the overdevelopment of the industry and the importance of more storage of coal the report says in part:

"Already in our study we have come to see that underlying these immediate causes of scarcity and high prices—labor difficulties and transportation deficiency—are other causes; namely, the irregularity of demand and the overdevelopment of the mining industry. These basic factors apply directly only to bituminous coal but indirectly they affect anthracite as well, for anthracite is in competition with bituminous coal and the wage scale in the one industry is influenced by changes in the other.

Too Many Mines and Miners

"We find that in the bituminous industry since 1890 the mines have averaged, over the country as a whole, only 213 days out of a possible working year of 308 days. In 1920, a year of active demand, the average time worked was only 220 days, and in 1921, the year of depression, it dropped to 149 days, with many districts showing a figure much below this average. Over a long period comparatively little of the time lost has been on account of strikes and in the years when there are no strikes the aggregate time lost from all causes is about as great as in those when strikes occur. In the 23 years over which the statistical record of strikes extends, the time lost because of strikes has averaged nine days a year, or less than 10 per cent of the time lost for all causes combined.

"The other attributed cause, lack of transportation facilities during the annual peak of railroad business, commonly known as car shortage, enhances the cost to the consumer, but it does not explain the short working year for the miners. Short working time is the result of overdevelopment in the industry. There are more mines and more miners than the needs of the country require.

"A cause of part-time operations of the bituminous mines is the variation in demand for the product, in part annual and in part seasonal. In so far as the irregularity in demand is seasonal, greater in cold weather than in summer, the lost time in summer is unavoidable unless some means can be devised to encourage the storage of coal during the dull months. The seasonal fluctuation in demand varies greatly from one district to another; in some fields of the East it is unimportant; further west it is dominant. Moreover, our preliminary studies show that even in times of maximum demand the mines as a whole do not work full time. In other words, the mine capacity is in excess even of maximum requirements. Although the country has never been able to absorb in a year more than 579,000,000 tons of bituminous coal, the present capacity of the mines is well above 800,000,000 tons.

"The seasonal character of coal movement is a serious handicap to the railroads in those districts where it is the rule. If the peak demands of the mines are to be met the carriers must provide equipment for which there is no use in the off-season. The unequal distribution of work between mines, attributed by many persons to the assigned and private car system, is also being considered by the Interstate Commerce Commission at this time. By this system men in one mine may get perhaps only one day's work a week and others, even in an adjoining mine, may get six days' work, causing discontent and strengthening the demands for higher rates of pay applicable to all.

"As for the public, the cost of maintaining an overdeveloped industry is reflected in the high price of coal. We do not know accurately the extent of burden, but it may well be measured by the cost of keeping in the industry an excess of perhaps 200,000 miners and their families and the excess investment in mines.

"The commission is convinced that there can be no permanent peace in the industry until this underlying cause of instability is removed. Diverse causes have apparently promoted overdevelopment and inquiries are in progress as to the relative importance, among others, of the following: The policy of railroads toward encouraging the opening of new mines and new mine fields as sources of revenues; car distribution rules that permit, if they do not encourage, larger capacity than the market obviously requires; the opening of new mines by large consumers; the establishment of freight rates that encourage the development of new fields; shifts in centers of consumption that abandon old fields and encourage new fields; the difference between union and non-union wage costs; large scale suspensions in the unionized fields, and irregularity of demand.

"A preliminary survey indicates that much can be done to overcome irregular demand by encouraging the storage of coal, and the commission cannot stress too strongly the great advantage of coal storage during the spring and summer for

fall and winter use. Coal storage, generally adopted by the consumer, large and small, would benefit the carrier systems of the country by equalizing their load. It should have the effect of reducing the price of coal to the consumer.

"The way in which to reduce the overdevelopment of the mining industry is fraught with so many complications, not all of which are evident at first glance, that the commission has not yet had time to ascertain sufficient facts on which to base any recommendations now to be made to the Congress. While it might be expected that in an overdeveloped industry aggressive competition would have driven out mines with high producing costs and forced prices to the consumer down to a minimum, so many such complex factors have operated to prevent the free play of economic forces that a very detailed and comprehensive investigation is required before a valid conclusion can be reached.

"There can be no satisfactory agreement as to wage rates and no lasting peace between operators and men unless steadier employment can be provided. There can be no satisfactory solution of our transportation problem as long as the railroads are subjected to sudden peak loads of coal traffic at the season when the demands of agriculture and industry are at their height.

"The commission believes that the public interest in coal raises fundamental questions of the relation of this industry to the nation and of the degree to which private right must yield to public welfare. It may be that both private property in an exhaustible resource and labor in a public service industry must submit to certain modifications of their private rights, receiving in return certain guarantees and privileges not accorded to purely private business or persons in private employ."

Railroad Committee Urges More Liberal Policy

Adoption by legislative and regulatory bodies of a liberal policy towards the carriers in order that railroad credit can be strengthened, thus enabling them to increase their facilities and keep pace with the industrial development of the nation, was urged in the preliminary report made to the coal commission by a special committee appointed by the American Railway Association to render such assistance as possible to the fact-finding commission. J. E. Roberts, superintendent of transportation of the Delaware & Hudson, is chairman of the committee.

Referring to the production and distribution difficulties in the coal industry, the report in part said:

"We have endeavored to inform the commission as to the causes of the trouble, so far as the railroads are factors in the situation. We have set out some facts as to the extent of car shortages in times of peak demand, and have stated our views as to certain suggested remedial measures. We feel that the real remedy is to be found in the adoption by the American people, speaking through legislative bodies and regulating commissions, of policies which will bring about:

"1st. Such an attitude toward the railroads as will convince the public that money invested in railroads will receive a fair return, thereby strengthening railroad credit and making it possible to increase railroad facilities so as to care for the growing transportation needs of the country.

"2nd. Peace in the coal industry and in the railroad industry, with such relations between employers and employees as will prevent strikes, the fruitful cause of interrupted production and restricted transportation.

"It has been intimated that an immediate contributing cause of difficulty is found in 'inadequate transportation facilities.' To what extent the conditions which create this impression are attributable to the abnormal overexpansion of the coal industry by the uneconomic multiplication of mine operations, it is not our province to determine. It is enough to point out that there is an immediate demand on the part of an important section of the shipping public for additional rail transportation facilities; and, furthermore, the growth of the country and the increase of its commerce would, in themselves, constitute sufficient reasons for developing the carriers' facilities to meet the demands which are sure to be made upon them. But this can only be done by the investment of additional capital, and additional capital can be secured only by the reasonable assurance of a fair return, and this assurance will not exist unless the investing public has reason to expect from the government a liberal, and not a repressive attitude."

The report calls attention to the fact that in 1920, a total of 14,766 bituminous coal mines were in operation, an increase of 154 per cent over the total number in operation in 1910, while coal production increased only 37 per cent.

"This shows a continual decrease in the production per mine," the report says. "Had the 1910 tonnage production per mine been maintained in 1920, the tonnage of that year could have been produced by 7,950 mines instead of 14,766.

"This means that the railroads were called upon to divide the available cars among 6,800 more mines in 1920 than would have been necessary had the average production per mine been maintained on the 1910 basis. Expressed in another way, it means that the 150,000,000 tons by which the coal production in 1920 exceeded 1910 was gathered from 6,800 additional mines, calling for vastly increased motive power, coal car supply, and man-power for the railroads to serve them all.

"While complete statistics for 1922 are not as yet available, such information as is in hand justifies the conclusion that this tendency toward inflation of the bituminous coal industry continues. The expansion was not confined to the increase in number of mines. The number of cars ordered, based on the rated ability of the mines to produce coal, kept pace with the increase in number of mines, until for the year 1920 the mines ordered cars sufficient to load 830,000,000 tons, which was 46 per cent more than the total consumption of the country. In October and November, 1922, after the mines got fully under way following the miners' strike, the mines of the United States ordered cars for 165,000,000 tons, which was at the rate of approximately 1,000,000,000 tons per annum, or at the rate of twice the annual consumption of the country.

"The outstanding feature is the enormous increase in the number of mines contrasted with the relatively small increase in production, and is, we believe, a prime factor contributing to the plight in which the bituminous coal industry and the country finds itself at this time.

"It has been shown that the coal produced increased from 1910 to 1920 37 per cent while the number of mines increased 154 per cent, requiring a greater amount of transportation service. To meet this increased demand the railroads provided additional coal cars, with an increased aggregate tonnage capacity of 42½ per cent, in comparison with an increase of coal tonnage produced of 37 per cent.

"In addition, the aggregate tractive effort of the motive power provided by the railroads increased 53.1 per cent. Furthermore, the investment in road and equipment, for the purposes of coal and other traffic, increased 39.7 per cent.

"It is therefore pleasing to note the increase in transportation efficiency from the fact that a greater transportation capacity was provided with a minimum increase in individual units.

"It further indicates an economical policy in providing transportation facilities.

"The results of this policy are to be found in the freight transportation service rendered by the railways during this same period, for in 1920 they handled an increase in freight traffic of 62½ per cent, measured in net ton miles, compared with 1911. This increased freight service in 1920 was accomplished with an actual decrease in the number of freight

train miles, while there was an increase over 1911 of 46 per cent in the average train load."

The report points out that strikes among certain classes of railroad employees, miners, longshoremen, lake seamen and tug boat men "have all been potent factors in disrupting the orderly and regular flow of coal from producing centers to their normal markets."

"This has thrown undue and abnormal strains upon transportation facilities," the report added, "causing congestion of railway channels and gateways which decidedly slowed up movement of loaded and empty coal cars through such congested channels and gateways, causing great loss of car utilization and decreasing the number of cars available. It will thus be seen that general car shortage periods are usually related closely to major industrial disturbances.

"It seems that the railways have fairly kept pace with the increase in coal production but even with such additions and improvement they are unable to provide adequate service to accommodate a sporadic expansion and contraction of the coal industry such as has existed in recent years.

"Notwithstanding the fact that, as shown by the foregoing figures, railroad facilities have increased in greater ratio than coal tonnage, and in spite of the fact that there have been frequent periods when a substantial portion of the carriers' equipment has been stored for lack of traffic, it has also happened that the carriers have been unable to furnish transportation service for the traffic currently offered. In such situations the public insistently contends, as in fact the bituminous coal operators are doing at the present time, that the facilities of the carriers are inadequate. It is, of course, certain that the commerce of the country will increase with resulting increase of traffic, and that periods will continue to recur when the railroads will be unable, as heretofore from time to time, to transport traffic as offered. If the public desires such service, it is obvious that the facilities of the carriers will have to be substantially increased in order to enable them to meet the public demand, which increase will be possible only in the event that railroad credit is strengthened and a more liberal treatment extended than has heretofore prevailed."

Pennsylvania Labor Board Case Argued in Supreme Court

WASHINGTON, D. C.

ARGUMENT in the first case to reach the United States Supreme Court involving the power of the United States Railroad Labor Board under the Transportation Act was heard on January 11 on the appeal of the Pennsylvania Railroad to restrain the Labor Board from interfering with an election of employee representatives, from declaring void contracts between the company and its employees and from publishing an opinion that the company had violated Labor Board decisions.

The case reached the Supreme Court on an appeal by the company from a decision of the circuit court of appeals. The circuit court reversed a decision of the district court which had sustained the Pennsylvania and had granted a permanent injunction against the board.

The Pennsylvania contends that the Transportation Act does not empower the Labor Board "expressly or under a discretion—"

"(a) To compel carriers to confer with officers of labor unions and system federations of labor unions, as such, in negotiating rules and working conditions with their employees;

"(b) To compel carriers to agree that a labor organization may act through representatives of its own choice in negotiating rules and working conditions with carriers whether such representatives are employees of the carrier or not;

"(c) To declare that the majority of any craft may select an organization to represent its members in negotiating rules and working conditions and that the carrier shall agree thereto and confer with the designated organization;

"(d) To declare elections held to select conferees under Section 301 of the said title (of the Transportation Act) void;

"(e) To invalidate contracts covering rules and working conditions which are being conformed to by all the carrier's employees, union and non-union alike."

If the Labor Board's decision was not authorized under the Transportation Act, the company says, the Labor Board "is without power or discretion to publish the Pennsylvania Railroad Company for refusing to conform thereto to the irreparable injury to its property which the bill alleges would inevitably follow such publication."

The company further contends "that if said act authorizes the Board as above, it violates the due process clause of the Constitution of the United States and is void."

In its appeal the Pennsylvania maintains among other things that the circuit court, in reversing the action of the District Court, erred in many important respects, which are cited in detail.

The company says in its statement of the case:

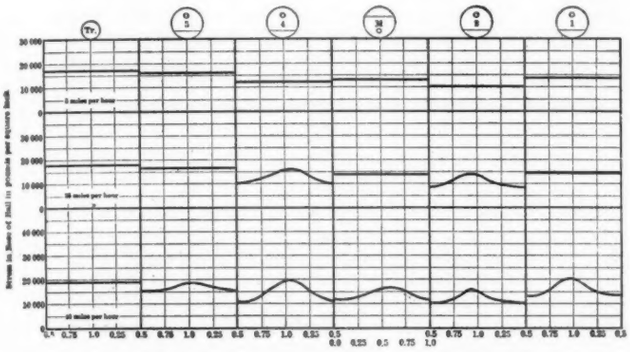
"The foregoing assignments of error, respectively, go to the question of power in the United States Railroad Labor Board under the provisions of Title III of the Transportation Act of 1920 to render (decisions) . . . declaring elections void, invalidating contracts, ordering new elections held and prescribing the form of ballot and rules under which the eligibility of employees to vote must be determined, as it did therein, and the power of the Labor Board to order publication of appellant (Pennsylvania) for refusing to conform to the provisions of said decision. . "The argument to sustain each of said errors is therefore directed to the question of the power of the Labor Board under Title III of the Transportation Act of 1920. The question thus presented can be determined only by a construction of pertinent sections of Title III of the Transportation Act. The foregoing assignments of error also raise the question of the constitutionality of the act, if it should be determined that its language authorizes the said decisions and orders of the board."

Vienna—Danube Bridge of the Northern Line, Austrian State Railways

The Stresses in Straight and Curved Track

Third Progress Report Presented at Annual Meeting of the American Society of Civil Engineers

THE annual meeting of the American Society of Civil Engineers was held on January 17, 18 and 19, at the Engineering Societies Building, New York City. The following officers were elected: President, C. F. Loweth, chief engineer, Chicago, Milwaukee & St. Paul, Chicago; vice-presidents, G. S. Davison, president, Gulf Refining Company, Pittsburgh, Pa., and Anson Marston, dean of



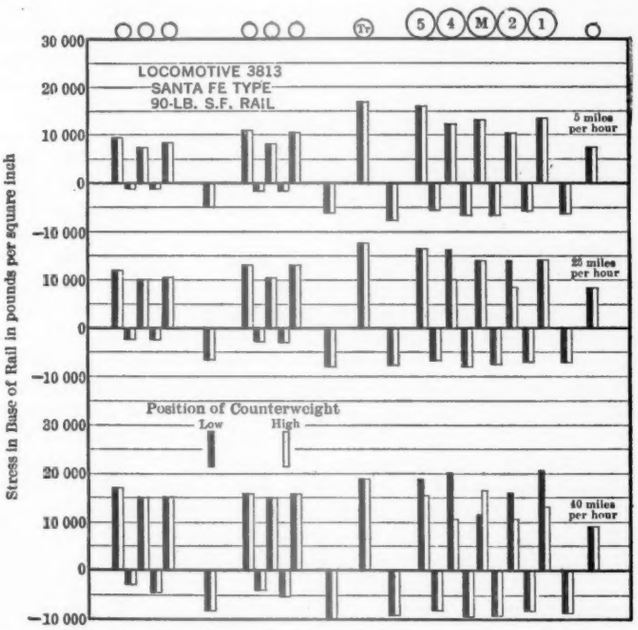
Curve of Average Stress on Straight Track Throughout Revolution of Driver—Heavy Santa Fe Type

engineering, Iowa State College, Ames, Iowa; and directors; District 3, G. D. Holmes, Syracuse, N. Y., District 5, E. B. Whitman, consulting engineer, Baltimore, Md., District 7, G. H. Fenkell, Detroit, Mich.; District 8, T. L. Condron, consulting engineer, Chicago; District 9, R. N. Begien, general manager, lines west, Baltimore & Ohio, Cincinnati, Ohio; and District 12, G. C. Mason, Portland, Ore. Honorary memberships were conferred upon Leon-Jean Cragnaud, Paris, France, Sir Maurice Fitzmaurice, London, England, Clemens Herschel, New York, John Frank Stevens, New York, and William Cawthorne Unwin, London, England.

Among the reports of more than ordinary interest to railway men were the progress report on Stresses in Railway Track and the report of the special committee on Specifications for Design and Construction of Steel Railway Bridge Superstructure. An abstract of the former follows:

The first progress report of the committee was abstracted on page 403 of the February 22, 1918 issue of the *Railway Age*. In this report, a method of analysis for determining the moments and stresses in the rail by considering the track as an elastic structure was presented. The second progress report was abstracted on page 670 of the March 5, 1920 issue. This report gave the results of tests on two railroads, with several types of locomotives, to determine the stresses in rail in relation to speed and counterbalance effect.

The work reported herein includes tests on straight track and curved track. In the tests on straight track, consideration was given to the effect of counterbalance, the effect of speed and the combined effect of speed and counterbalance, and the lateral bending moments and stresses in the rail. In the tests on curved track are taken up the general action of curved track as the locomotive traverses the curve, the magnitude of the vertical bending stresses in the rail and the corresponding vertical loads producing them as contrasted with



Stress on Straight Track at High and Low Position of Counterweight—Heavy Santa Fe Type

the normal loads, the lateral bending moments and stresses under the several wheels, the distortion of the alignment of the curves, and the general effect of speed, degree of curve, and super-elevation. The tests were conducted on the Illinois Central, the Delaware, Lackawanna & Western, the Atchison, Topeka & Santa Fe, and the Southern Pacific. In the tests, 13 locomotives of eight distinct types were used. In several types, there were variations in the design of the locomotives of the different railroads. The report is presented under

DATA OF THE TRACK

Track	Location	Rail section	Date of laying	Tie-spacing	Depth of ballast Inches	Grade, percentage	Gage	Super-elevation of outer rail	Speed of super-elevation, in miles per hour
Tangent	Ribera, N. Mex.	90-lb. S. F.	1917	18	12	—1.40	4-8½	...	..
6° curve	Ribera, N. Mex.	90-lb. S. F.	1917	18	10	—1.18	4-8⅞	4.7	35
10° curve	Ribera, N. Mex.	90-lb. S. F.	1920	19	10	—1.02	4-8⅞	4.7	27
Tangent	Fast Fort Madison, Ill.	85-lb. Am. Soc. C. E.	1906	20	22	0.0	4-8⅛	...	..
10° curve	Fort Madison, Iowa	90-lb. S. F.	1920	21	14	0.0	4-9⅛	2.0	17
Tangent	Dover, N. J.	105-lb. D. L. & W.	1915	22	12	—0.55	4-8¾	...	..
4° curve	Dover, N. J.	105-lb. D. L. & W.	1919	22	18	—0.63	4-8⅞	3.7	37
6° curve	Mt. Tabor, N. J.	92-lb. Frictionless 101-lb. D. L. & W.	1914 1915	22	6	—0.84	4-8¾	8.5	46
7½ curve	Paterson, N. J.	105-lb. D. L. & W.	1919	20	9	0.0	4-9	6.4	36
10° curve	Bealville, Cal.	90-lb. A. R. A.-A.	1921	22	5 on old grade	2.00	4-8⅞	4.4	26
10° curve	Cajon, Cal.	90-lb. S. F.	1920	18	10	1.80	4-8½	5.4	29
7° curve	Murphysboro, Ill.	90-lb. A. R. A.-A.	1914 1919	20	12	0.0	4-9⅛	3.7	28
14° curve	Champaign, Ill.	85-lb.	1903	19	Cinder	0.0	4-8⅞	3.8	20

the heads of Tests on Straight Track and Tests on Curved Track, covers 162 pages and records the results of 470,000 readings of operations.

The Conduct of the Tests and the Reduction of the Data

The methods used in the tests of track were the same as those used in the tests described in the first and second progress reports. Eight stremmatographs were used simultaneously. Four stremmatographs were placed on one rail between ties at distances apart approximately equal to the average spacing of the drivers of the locomotive used on the test, and the other four instruments directly opposite on the other rail.

The chief purpose in using eight instruments, however, was to facilitate the tests on curved track, where, of course, the stresses in the two rails are generally unequal. The use of two discs in each stremmatograph, one recording the strain at one edge of the base of rail and the other that at the other edge, permitted the measurement of the lateral bending strains in the rails of curved track. It is believed that these tests were the first measurements of the bending stresses developed on curved track. The means used were entirely successful.

Tests on Straight Track

The tests on straight track, although made for the purpose of supplying a basis of comparison with results on curved track, furnish considerable additional information on the action of straight track, particularly on the effect of speed and counterbalance with several types of locomotives. To determine the stiffness of track and the value of the modulus of elasticity of rail support, u, measurements of track depression under the truck of loaded cars were made.

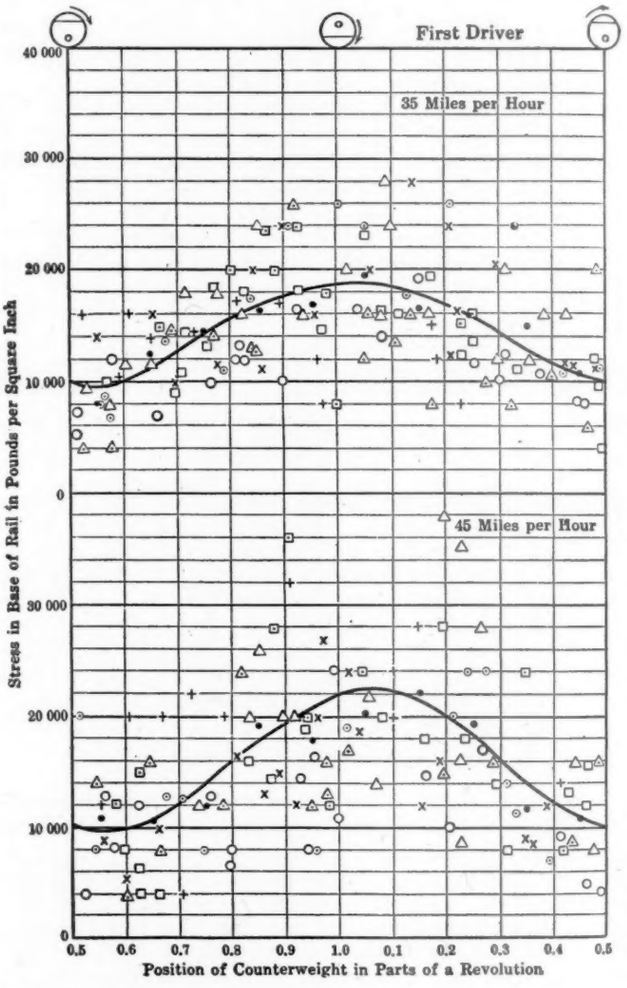
The results of the measurements were arranged in tables which give the average or mean values of the stresses in base of rail under the locomotive wheels found in the tests, and also the values at the high point and the low point of the counterweight. The calculated stresses under the nominal static wheel loads were also given. The calculations are based on the method of analysis given in the first progress report, and the value of u from the tests of track depression was used It was noted that the calculated values of the stresses for static loads in general do not differ greatly from the observed values at a speed of 5 miles per hour. Where there is a noticeable difference, it seems probable that the actual distribution of load among the individual wheels is not the same as the assumed distribution. It is found, however, that the average of the calculated stress under the several wheels of the locomotive is almost exactly the same as the average of the observed stresses under the wheels at a speed of 5 miles per hour, the greatest difference in all the tests being about 6 per cent.

Effect of Locomotive Counterbalance

As may be expected, at a speed of 5 miles per hour, the variation in stress due to other causes is so much greater than that due to the effect of counterbalance as to mask any effect of counterbalance.

From the data it was noted that the highest stress in the rail under the main driver in all the locomotives except the Pacific type of the Delaware, Lackawanna & Western and the Balanced Compound Prairie type of the Atchison, Topeka & Santa Fe occurs when the counterweight is up. For several of the locomotives, a calculation for the counterbalance in the main driver would indicate that, in many cases, the high stress may be expected to occur when the counterweight is down, if the method of calculation is that so generally used of neglecting the effect of the plane of motion of the main rod and other outside rotating parts not being coincident with the plane of motion of the counterweight and wheel and rail, whereas, the opposite condition may be shown by the results.

In general, for all the locomotives except the Light Santa Fe type, the stresses attributable to counterbalance at the highest speeds run, which in some cases were greater than the scheduled maximum speed allowed for the locomotive, are less than 5,000 lb. per sq. in. and, in most cases, considerably less than this. The counterbalance effect at the highest speeds used may be said generally to be not more than 30 or 40 per cent of the average stress in rail at 5 miles per hour; in some few cases, it runs higher; but, in most cases, it is lower. A counterbalance effect of 30 per cent will not be considered to be excessive, and the only question is whether the scheduled speeds are likely to be exceeded very much. It is seen that an increase of speed of 25 per cent will increase the counterbalance effect by 56 per cent of itself, and an increase of speed of 41 per cent will double the counterbalance effect. It is evident that great care must be exercised to prevent the scheduled limits of speed being exceeded very much if the stresses due to counterbalance are to be kept within moderate bounds. It is also clear that every care should be taken in the design, construction, and maintenance of the proper counterbalance, and checks should be exercised to insure that the conditions of counterbalance are known with certainty, as it has frequently happened that the counterbalance effect has varied from the reported or expected condition. Attention should be given to the main driver and a careful determination made of the effect of the



Observed Values of Stress on Straight Track, Light Santa Fe Type

outside rotating parts not being in the plane of the wheel and counterweight.

Effect of Speed and Combined Effect of Speed and Counterbalance.

With the exception of the Light Prairie type and the Light Santa Fe type, the general increase in stress in rail under the drivers due to speed alone in changing from 5 miles per hour to the highest speed used in the tests ranges from 15 to 27 per cent, which may be called a moderate and allowable speed effect. With the same exceptions, the maximum speed effect under any one driver ranges from 24 to 30 per cent. For these locomotives and these tracks, therefore, the increase in stress in rail due only to the change in speed noted may be said generally to be less than 35 per cent.

Speed, in miles per hour.	Position of counterweight.	Trailer.		Driver Number.					Front truck wheel.
		2	1	5	4	Main.	2	1	
5	Mean value	9 200	8 900	9 500	11 400	11 100	11 900	11 900	11 700
25	Up	.....	.....	9 000	10 500	15 500	11 000	12 500	.....
	Down	.....	.....	12 500	14 500	9 000	15 000	15 000	.....
	Mean value	10 400	10 100	10 100	12 400	12 200	13 000	13 900	12 400
40	Up	.....	.....	10 500	9 500	20 000	11 000	12 500	.....
	Down	.....	.....	14 500	15 500	10 000	16 500	16 500	.....
	Mean value	11 500	11 100	12 400	12 800	12 900	14 000	14 900	13 300
Calculated stress under static load.		8 700	7 500	12 600	9 500	10 000	11 200	14 500	8 600
Calculated additional stress due to counterbalance at 40 miles per hour		.....	.....	+3 700	+3 600	-2 800	+3 600	+3 700	.....

Stresses with Double Trailer Type Santa Fe on Curves

For the combined effect of speed and counterbalance for the same locomotives for the maximum speed used, the range of general total increase in stress in rail is 30 to 53 per cent, and the maximum increase under any driver ranges from 43 to 80 per cent. The stresses in rail at the maximum range from 20,000 to 29,000 lb. per sq. in., in the three sections of rails used.

Principal Values of Increase in Stress in Rail at a Given Speed Over the Stress at 5 Miles Per Hour

The Increase Is Given in Percentage of the Stress at 5 Miles Per Hour

Type of locomotive	Drivers: Speed alone, General value	Drivers: Speed alone, Maximum under one driver	Drivers: Combined speed and counterbalance, General value	Drivers: Combined speed and counterbalance, Maximum under one driver	Trailer	Tender wheels, General value	Tender wheels, Maximum under one wheel
Atchison, Topeka & Santa Fe Railway:							
Pacific, 60 miles per hour	27	30	53	53	15	75	93
Balanced Compound Prairie type, 50 miles per hour	15	26	30	43	29	50	87
Mountain, 60 miles per hour	20	30	35	50, 55	10	40, 60	110
Light Santa Fe, 45 miles per hour	40	77	105	190	10	25	35
Heavy Santa Fe, 40 miles per hour	18	28	50	80	15	75, 70, 50	110
Delaware, Lackawanna & Western Railroad:							
Pacific, 60 miles per hour	20	24	42	59	14	45	57

Stresses at the Two Edges of the Base of Rail

In the two preceding progress reports, reference was made to the frequent and common lateral bending of the rail in straight track, and it was shown that the stresses due to such bending attain considerable magnitude. The data of the tests give added information on the subject.

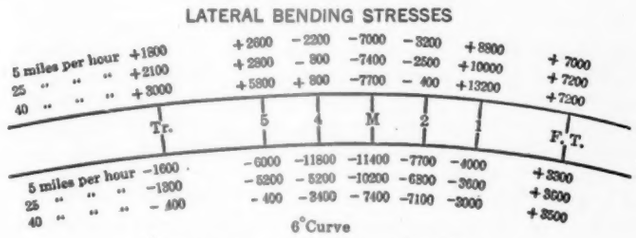
A study of the data shows considerable variation between the stresses at the two edges. The stress at the outer edge of the base of rail is quite frequently 33 per cent or more greater than the mean stress in base of rail, in a few cases reaching an excess of 50 per cent or more, and this holds true throughout the revolution of the driver. A stress at the inner edge 33 per cent greater than the mean stress and even more was found, although less frequently. This means that in these cases the stress at one edge of the base is twice as much as that at the other, or more.

Result of Tests on Curved Track

The mean stress in the base of rail (the average of the stresses observed at the two edges and generally hereafter called the vertical bending stress), may be taken as representative of the bending of the rail in a vertical plane, or, more strictly, of the bending in a direction normal to the inclination of the track, the two effects being practically identical for the super-elevation of the track used in the tests as the cosine of the angle of inclination is very close to unity. Although stresses in rail are not exactly proportional to the loads when the same total load is differently distributed among the several wheels or differently divided between the two rails, yet, when the differences are not great, the sum of the stresses in the rail under all the wheels will generally not differ greatly for different divisions or distribution of load, and summations of the stresses for each rail may be useful for making comparisons and in checking the action of the locomotive and track.

For lower speeds, the division of stress between the two rails (and presumably also the division of load) for the Pacific type on the 4 and 7½ deg. curves of the Delaware, Lackawanna & Western and the Mountain type and Heavy Santa Fe type on the 6 deg. and 10 deg. curves of the Atchison, Topeka & Santa Fe agree very closely with the ratios calculated from the inclination of track and centrifugal force. The stresses observed under the Mikado type on the 4 deg. curve at the lower speeds give ratios which are much closer to unity than the calculated ratios; it is not known why these differ; for the 7½ deg. curve the agreement is close. The Pacific type of the Atchison, Topeka & Santa Fe, on the 10 deg. curve, with a super-elevation of 2 in., gives ratios of observed stresses which vary from unity by an amount that is about twice as great as the calculated ratios. It appears from this that, for slight super-elevation, curvature alone gives an effect in changing the division of load between the two rails greater than that found from the inclination of track and the centrifugal force. Evidently, there is some transfer of load by other means, possibly the action of the equalizing levers. For the higher speeds, above those corresponding to the speeds of super-elevation, more variation in the results are found.

It is evident that the changes in vertical bending stresses and in vertical loads at the several drivers are very marked and that important additions to the bending moments in the rail and in the bearing pressures at the top of the rail are found on curves. The increased stress in the inner rail under certain drivers is greatest at the low speed, but even at speeds two-thirds that corresponding to super-elevation increases of stress of 75 to 85 per cent of the increase found at the low speed were common. At the higher speeds, the special increase in load at the one driver vanishes, and the distribution among the several drivers is much the same as would be expected from a consideration of transverse inclination of track and centrifugal force, except that the vertical bending



Heavy Santa Fe Type Locomotive 3813
Superelevation 4.7 in. for 35 miles per hour

stress in the outer rail under the outer front driver is very great at the high speeds.

It was noted that for all the curves the relation of the average of the vertical bending stresses under all the wheels of a locomotive on the inner rail to the corresponding average of the stresses in the outer rail, taken as a measure of the bending of the rail in a vertical plane, in the main conform fairly closely to what may be expected from the analytical consideration of the transverse inclination of the track and the centrifugal force, as far as the locomotive as a whole is concerned. The principal variation from this conformity to analysis was the Pacific type locomotive on the 10 deg. curve having a super-elevation of 2 in.

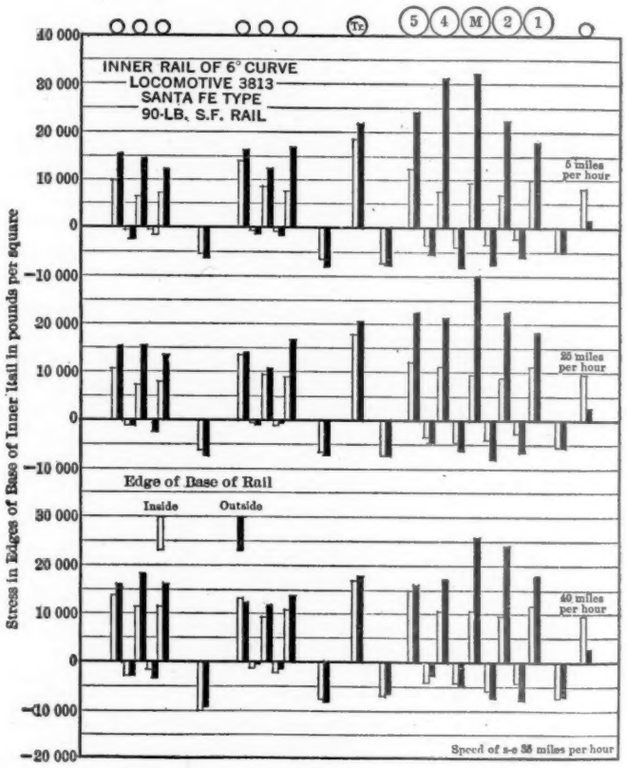
The outstanding result of the study of vertical bending stresses on curved track is the variable distribution of load among the drivers, and, particularly, the greatly increased loads found on some of the drivers beyond that normally expected. These high loads occur principally on the inner rail and are most marked at the low speed, although high values were found in a number of cases at speeds two-thirds that corresponding to the super-elevation. Further examples of high loads under individual drivers at moderate speeds occurred in the tests in California. Loads ranging up to 100 per cent in excess of the normal load were found with several of the locomotives. These excessive loads produce high stresses in the rail, but more important still they give very high bearing pressures on the rail. As the bearing pressures found are considerably higher under some of the wheels than those which ordinary analysis of the effect of transverse inclination of track and centrifugal force would predict, it would seem well to have a study made of the action of the equalizing levers and the springs on curved track to try to find the cause of the concentration of load, and to attempt to modify the design so as to obviate such gross inequalities.

Lateral Bending of Rail on Curves

The magnitude of the lateral bending stresses in the outer and inner rails under the several wheels of the locomotive and tender at the speeds at which tests were made was recorded, the stress being given in pounds per square inch, for the tests at Ribera, N. Mex., Fort Madison, Iowa, and Dover, Paterson, and Mount Tabor, N. J. This lateral bending stress is the stress by which the stress at one edge of the base of the rail exceeds that at the middle of the base of rail; its magnitude is found by taking one-half the difference between the stresses at the inside and outside edges of the base of rail. The sign in front of the stress is indicative of the nature of the lateral bending of the rail; a positive sign indicates that the bending acts to increase the curvature of the rail, the negative that the bending tends to straighten the rail. The signs apply alike to both outer and inner rail. A positive bending in the outer rail at the point of contact of a wheel implies an outward thrust against the rail at the given point; a positive bending in the inner rail implies that a lateral pull on this rail acts toward the outer rail. The data gave important information on the presence and nature of lateral forces and the manner of the lateral bending in the rail. Some of the outstanding features may be noted, as follows:

The lateral bending in the outer rail, under the wheels of the front truck, is found to be always positive (indicating an outward thrust) and it is generally positive also in the inner rail. This is true at all speeds. It indicates that the flanges of the outer wheel of the front truck always have an important part in changing the direction of the locomotive when moving on curved track.

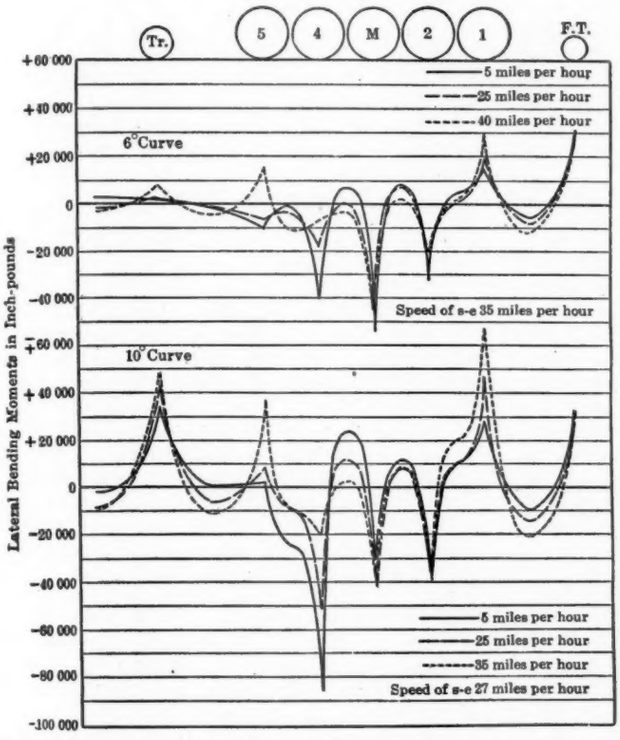
In the locomotive having two-wheel front trucks, the lateral bending of the outer rail at the outer front driver is positive at all speeds, with the exception of the Mikado type on the 6 deg. curve, where the super-elevation is 8.5 in. With the locomotives having four-wheel leading trucks, the bending at the outer front driver is generally negative at the low speed, becoming positive at a higher speed, with the exception that it remains negative in the case of the Pacific type locomotive on the 7½ deg. curve. The outer rear driver gives a positive lateral bending in the outer rail (outward thrust on the rail) at all speeds, the one exception being the Pacific type locomotive on the 4 deg. curve at a speed of 5 miles per hour. At low speeds, all the other drivers generally give negative bending in both inner and outer rail, tending to straighten the rail. The principal exception is that the bending moment under the inner fifth driver of the Santa Fe type locomotive is sometimes positive. An increase of speed results in an increase of lateral bending in the outer rail,



Stress at Edges of Base of Inner Rail on 6-deg. Curve—Heavy Santa Fe Type

decreasing the value of the lateral bending stress if the bending is negative and increasing the stress if it is positive. An increase of speed results in a decrease in the lateral bending in the inner rail, the numerical value of the lateral stress decreasing when the bending moment is negative and increasing when it is positive. When the stress due to lateral bending is combined with that due to vertical bending, it will be seen that the resulting stress may be very great. This is the more marked because the high lateral bending stresses generally occur under wheels giving very high vertical bending stresses, much greater than those developed on straight track. Thus, for example, at the outside edge of the base of the inner rail of the 10 deg. curve under the fourth driver of the Santa Fe type locomotive, at 5 miles per hour, the stress is the sum of 23,500 and 29,200, resulting in a stress of 52,700 lb. per sq. in. This value is the average of a large number of runs; not infrequently stresses several thousand pounds greater than this were found, indeed, one of 75,000 lb. per sq. in. was recorded. It may be added that the value of the lateral bending stresses under many of the wheels ranged from 40 to 100 per cent of the vertical bending stress under the same wheel.

The general trend of the combined bending moments under and between the several wheels is very striking. Intense and severe lateral bending action comes on the track as a whole as the locomotive passes around the curve, tending to push the ties and ballast first to one side and then to another and to throw the curve out of line. The ratio of the lateral bending moment in the inner rail under the fourth driver of three Santa Fe type locomotives (two of them belonging to the Atchison, Topeka & Santa Fe and one to the Southern Pacific) to the vertical bending moments developed at the same time averages 0.16 at the lowest speed on the 10 deg. curves. It should be recalled too that the vertical bending stress under this driver was far greater than the normal and that the pressure of the driver on the rail must have been



Combined Lateral Bending Moments in the Two Rails of Curved Track—Heavy Santa Fe Type

nearly twice the normal load. The ratio of the lateral bending moment under the same wheels to the vertical bending moment found generally on straight track averaged 0.04, although values as great as 0.14 were found. As the section modulus of the rail about a vertical axis is only about one-fifth that about a horizontal axis, the lateral bending stresses in the rail are relatively great in comparison with the lateral bending moments. It will be seen that the lateral bending effect on the 10 deg. curve under the fourth driver of this locomotive (taking the average value found) is at least four times the average value found on straight track and at least twice the highest value that may be expected.

Effect of Speed and Counterbalance on Curves

The effect of counterbalance on the stresses in rail on curved track is much more variable than that found on straight track. One interesting result of the study of the data is that, under a number of the wheels, the stresses at the outside edge of the rail showed marked effect of counterbalance, whereas, those at the inside edge show almost no counterbalance effect.

The effect of speed on the division of the load of the locomotive between the two rails of the curve is quite another matter. At and near the speed of super-elevation, in most of the tests on curved track, the vertical bending stresses in the two rails do not differ much from each other. It may be noted that analysis shows that the speed may be increased considerably beyond the speed of super-elevation before the load on the outer rail would become equal to that imposed on the inner rail at low speeds. Although the ratio varies with the degree of curve and the super-elevation used, it may be said that for the track used in the tests the speed may be increased 30 to 40 per cent beyond that of super-elevation before the load on the outer rail may be expected to equal that found on the inner rail at low speeds. The foregoing discussion refers to the sum of the loads under all the wheels; the distribution of load among several drivers may be quite unequal, the vertical bending stresses in the rail under one driver of one type of locomotive being as much as double what might be expected in the case of the 10 deg. curve and 50 per cent more on the 6 deg. curve. The lateral bending stresses developed in the rails also vary with the speed. The lateral bending stresses in the inner rails are very great at the slow speeds, especially at the driver in front of the rear driver, and sometimes the one in front of this, in the case of the locomotives having eight and ten drivers. For medium speeds, say, up to two-thirds of the speed of super-elevation, the lateral bending stress under the rear intermediate driver continues to be of considerable magnitude. For the higher speeds, the lateral bending stresses under these wheels decrease markedly and at the speed of super-elevation the highest lateral bending stress in the inner rail may not differ greatly from the highest stress found in the outer rail. The greatest lateral bending in the outer rail under a driver is found at the outer front driver in those locomotives in which the wheel of the leading truck does not assume the principal part in changing the direction of the locomotive. With an increase in speed, this lateral bending stress increases. As the stresses in the outer rail under the wheels of the front truck do not increase with an increase in speed, it is evident that the greater effort to change the direction of the locomotive at the higher speeds is taken by the flange of this first outer driver.

Type of Locomotive

In the matter of changing the direction of the locomotive, it seems evident from the tests that the four-wheel truck of the Pacific and Mountain types presents advantages over the two-wheel truck of the Santa Fe and Mikado types. With the four-wheel leading truck used, the loads on the wheels are such as to give moderate vertical bending stresses. With the locomotives having the four-wheel trucks, there is little or no outward bending stress developed in the outer rail under the first driver, this driver participating in the turning action only at the highest speeds. With the two-wheel front truck, the lateral bending stress in the outer rail under the first driver may become very great.

Lateral Bending of the Rail Section

When a lateral force is applied to the head of the rail and the base of the rail is held in place either wholly or partly, it may be expected that the rail web will bend and the head of the rail will deflect outwardly or inwardly relatively to the original vertical axis of the rail. Measurable values of the lateral bending of the rail section were found. The deflection varied from zero to 0.016 in. The values on the 10 deg. curve were somewhat higher than on the 6 deg. curve. The Santa Fe type gave somewhat higher values than the Mountain type. As would be expected from the low speed used, the deflections were greatest in the inner rail, and the direction of deflection in the inner rail was generally away from the track. The direction of the deflection in the outer rail did not always correspond with the character of the observed lateral stress in the base of rail. As the lateral bending of the rail itself is the result of a number of forces, including those acting at the supports of the rail, it is possible

that the sign of the bending moment at a wheel point may not be in keeping with the direction of the lateral force acting at that point. An interesting feature occurred when the Santa Fe type was backed over the track. A very high value of the deflection was observed in the inner rail under the fifth driver, a deflection of 0.016 in. away from the track for the 10 deg. curve, and one of 0.014 in. for the 6 deg. curve. The absence of leading wheels to guide the driving wheel-base is evident in these results. Values of the deflection as great as 0.007 in. were found at the wheels of the tender, the middle wheel of a truck on the inner rail giving large deflections.

Conditional Plan for Southern Pacific Control of Central Pacific

WASHINGTON, D. C.

OFFICERS of the Southern Pacific and the Union Pacific as well as most of the representatives of shippers and other organizations that are parties to the case before the Interstate Commerce Commission on the application of the Southern Pacific for authority to acquire control of the Central Pacific have signified their willingness to accept an arrangement involving terms and conditions intended to safeguard all interests in case the decision of the commission is favorable to the Southern Pacific's application. The proposed arrangement was outlined by the commission, as one that had been suggested to it for specific consideration, in the notice it sent out to the parties in the case of the oral argument to be heard by the full commission on January 19 and 20. The testimony was heard by Commissioners Meyer and Potter in November and December.

The notice stated that in order to expedite final disposition of the proceeding it was requested that upon the presentation to the commission of views on the questions generally involved there be included expressions regarding the arrangement to be sanctioned and required in case the decision is favorable to the application and particularly as to the suggestion that the commission give its authorization to the following extent and by the following means: By lease until December 31, 1984, which would be subject to termination by the commission if it is found to interfere with the consummation of its final plan of consolidation under Section 5 of the Interstate Commerce Act; or by ownership of all the issued and outstanding stock of the Central Pacific, subject to the following conditions:

First: The Southern Pacific shall join with the Union Pacific in maintaining via the lines of these companies between Omaha, Neb., and San Francisco Bay points, as parts of one connected continuous line, through passenger, mail, express and freight train service between San Francisco or Oakland, Cal., and Chicago, Ill., at least equal in every respect to that afforded by either with its connections between Los Angeles, Cal., or Portland, Ore., and Chicago, Ill.

Second: The Southern Pacific shall join with the Union Pacific in maintaining via the lines of these companies between Roseville, Cal., and Omaha, Neb., as parts of one connected continuous line, perishable freight train service from Roseville to Chicago at least equal in point of time to that afforded by either with its connections from San Bernardino or Colton, Cal., to Chicago.

Third: The Southern Pacific shall co-operate with the Union Pacific in the maintenance of train schedules under which neither shall discriminate as to time or service against the other in favor of any other connection through Ogden or Salt Lake City.

Fourth: The Southern Pacific shall, at the request of the Union Pacific, provide for the publication and maintenance of rates via the Central Pacific points through Ogden between all Southern Pacific and Central Pacific points in California, west of Banning, and Oregon on the one hand, and Colorado common points and points east thereof on the other, no higher than apply concurrently between the same points via any other route in which it participates. While the commission may have no power to impose any conditions upon the Union Pacific in this proceeding, it is suggested that the same course should be pursued by the Union Pacific in connection with rates between the same points via its various routes.

Fifth: The Southern Pacific shall co-operate with the Union Pacific to secure routing of maximum of freight traffic via the Union Pacific and Central Pacific lines between all points in California, north of and including Caliente and Santa Margarita (including points in Oregon on the Klamath Falls branch, Kirk and south) on the one hand, and points north and west of a line along the northern boundaries of Oklahoma and Arkansas to the Mississippi River, thence via the Mississippi and Ohio rivers, (but not including intermediate cities on the Ohio river) to Wheeling, W. Va., thence north on a line drawn just east of Pittsburgh and Buffalo to Niagara Falls.

President Gray of the Union Pacific and Chairman Kruttschnitt of the Southern Pacific have indicated in statements to the press that the suggested plan would be acceptable to their companies and most of the shippers' organizations that have participated in the case have indicated their approval in telegrams or other communications addressed to the commission. A large number of briefs in the case have been sent to the commission in advance of the oral argument.

The Southern Pacific in its brief included an abstract of the argument it proposes to make in the district court as to the effect on the Supreme Court's mandate of an order by the commission authorizing control of the Central Pacific by the Southern Pacific.

"Favorable action by the commission upon the pending application," it said, "will have the effect of creating a lawful situation out of the present unlawful situation by legalizing unified control and operation. It thus accomplishes the purpose of the executory provisions of the mandate. Such administrative action of the commission under authority of the transportation act is in the nature of legislative action. It will, therefore, supersede by its own force that part of the mandate requiring the destruction of unified control and operation because of its illegal character. It will not only relieve the court of the duty of carrying out that part of the mandate, but it will make insistence upon the execution thereof tantamount to a refusal to give subsequent legislation its due effect.

"Considering and giving effect to the new control does not involve a review or reversal of any question involved in the litigation and decided by the Supreme Court. It will still remain the law of the case that the old control was illegal. But subsequent events have rendered unnecessary the performance of the executory provisions of the mandate, which provide for a separation of the properties into two self-sufficient systems. Such separation of the properties was the only machinery available to the Supreme Court at the time.

"The operation of an act of Congress has removed the only reason for the resort to this machinery. A mandate directing something to be abated or destroyed because it is illegal ceases to be operative when the thing to be abated or destroyed is legalized by subsequent legislation. Favorable action by the commission upon the application will in no way contravene any principle of comity or interfere with or encroach upon the province of either the district court or the Supreme Court. It will simply put in force and effect a later law and give the new rights that law provides for."

New England Divisions and Transportation Act

An Analysis of the Intent of the Law and the Economic Bases Underlying This Problem

By J. Shirley Eaton

IN TWO PARTS—PART II

THE THEORETICAL conditions here outlined in describing the competitive group are not exactly typical of what is found on the railways, for the followings reasons:

1. The capacity of the individual road is never definitely exhausted and therefore the roads do not stand in a rigid order of priority to the marginal road in the ascending scale of their costs, but all of the roads all the time have part in the market regardless of their particular expense disabilities.
2. The disability of the marginal road is generally a permanent thing so that the same road is nearly always the marginal road.
3. The aggregate of railway values is so great that in the public interest and with any decent regard to the stockholders' interests they cannot be exposed to the instabilities of an entirely unprotected marginal position.
4. Guerrilla possibilities are great when so large a part of the price representing overhead, permits and tempts to rate cutting.

Due to the foregoing conditions which are specially found among them, carriers have from the first sought to stabilize their interrelations, integrating to the extent of a common rate control, effected directly or insured by division of tonnage. This was the status attained irregularly by the roads themselves before regulation by government bodies overtook them. Many sorts of contractual integrations had been irregularly accomplished and the machinery for collective bargaining on the side of the railroads very generally set up in various territories. With the coming of regulation the consumers, including those of least economic strength and significance on equal footing with the strong, through the governmental enforcement of uniform rates and by the processes of public hearing in open court, were joined into an arbitrary solidarity to effect bargains for account of all. On the other hand, the contractual solidarity previously achieved by the carriers was broken down and there was substituted the arbitrary solidarity that could be effected through the court. The Interstate Commerce Commission became the agency through which these bargains were negotiated and affirmed.

But the solidarity was only to the extent of protecting the weak against the strong by the device of the uniform public rate established as reasonable and open to all on equal terms. Relativities of rates were investigated and revised and individual rates or limited groups of rates shown to be unreasonable were corrected. But only four petitions came before the commission for revision of the entire rate level in order to produce fair return upon investment. One of these was denied, two irregularly or sparingly granted and the fourth granted in full during the war. Until the Transportation Act of 1920 there was no specific provision for the treatment of the situation "as a whole" which permitted the consumers, banded into complete solidarity through the agency of the Commission, to reach behind the position of the marginal road and lay claim to a share in the extraordinary profits of the most favored carriers.

When in the general rate increase of 1920 under ex Parte 74 the commission computed the increase in rates at a figure to overcome the amount by which the roads in the eastern group taken as a whole fell short of the desired 6 per cent, they dealt with the roads collectively. The net proceeds the resulting rates were designed to yield was in effect a merger of the net proceeds of the several constituent individual roads necessary to yield 6 per cent on their respective properties. It was a collectivistic figure. In the New England Divisions case the defendants maintained that what each road collected under rates thus constructed belonged to it in the same way as its earnings on those rates that were constructed for it individually without any reference whatsoever to the needs of any other road. And the plaintiffs definitely disclaimed any exception to this position. Yet to "distribute" the net proceeds of a collectivistic rate by a process of individual seizure, as each carrier happened to perform the service and make the collection, is absolutely inconsistent. It is confusion of the competitive and collectivistic processes. What is collectivistically produced cannot be competitively distributed. This seems axiomatic.

Relationship Between Strong and Weak Carriers

But if we ignore the obvious equities and consider the arithmetical processes only we reach the same result, for the law provides that the rates of revenue to be authorized shall as nearly as may be, produce a reasonable rate of return on the roads as a whole, and a figure of reasonable rate of return on the roads as a whole is an average figure. The competitive "distribution" of aggregate net proceeds as we have seen is a process of collection by individual differentials from a common base. Inherently a total levied at an average rate cannot be distributed to the several components of that average on the basis of the differential of each from that average. For when the average is taken for base line on which the differential structure of profits is erected the only differentials to produce profits are those whose costs are below the average cost. To those whose costs are above the average cost the differential is negative and therefore produces not a profit but a loss. And this is not a passing condition but a permanently established situation since by the very nature of the average one-half of the constituent elements at their weight must in each and every situation always be submerged below this average line of reasonable rate of return on property used for transportation. This is an impossible condition.

Furthermore, this loss would be incurred by these unfavored carriers for no other purpose than that the favored carriers should have a profit in excess of the declared policy of 6 per cent, produced under rates primarily restricted to yield 6 per cent. Such profits are comparable with the profits of pure gambling where there is no net loss or gain, the gain of the gainer being exactly offset by the loss of the loser. But in this case the loser has not even the gambler's chance of avoiding his loss, since his relative disabilities which are largely the cause of his loss are not matters of chance but fixed characteristics of his conditions of operation.

There have in effect been two collectivistic procedures. The first is a collectivistic bargain ostensibly with the rail-

roads for their capital requirements but in effect with free capital that can be made available for railroad needs. This collectivistic bargain (as applying to the case in hand) declares 6 per cent as the figure that is adequate to bid for this capital when it fixes 6 per cent as the just return on the capital already invested.

The second collectivistic procedure is the determination of the amount of money necessary to yield this 6 per cent at some actual time. The determination of this figure, the conversion of it into a rate schedule, the collection and distribution of the net proceeds of the rate schedule, constitute a joint or collectivistic operation under the terms of the collectivistic bargain already accomplished. The "as a whole" provision automatically erected a collectivistic group for the purpose of constructing a rate to be charged the shipper. Because the rate cannot be individualized to each road a flat rate was necessary, and because the flat rate was based on the average situation, it was inherently a composite rate in which each road had an equity. This equity was directly in proportion to the extent in which each road contributed in the making of the rate. These contributions differed from contributions to an ordinary fund in the respect that they were individual contributions towards the production of a composite specific amount, *viz.*, 6 per cent, which as a whole was not to be more as it was not to be less than 6 per cent. An 8 per cent present yield fell as far short from the designated allotment to the railroads as a whole as did 4 per cent on the other side. The difference did not represent an amount to be dissipated by waste but an amount which under the general terms of the deal with the railroads as a whole, being beyond the designated 6 per cent, fell back to the share of the government. The equivalent amounts of the respective overage or shortage were entered at their value on the budget and through the budget the final distribution is determined.

No Injustice in Apportioning Effects

Whatever may be the encroachment, if any, on the original scope of private property by at once minimizing its risks and sharing its profits as provided in the law, it is vital that at least there be no injustice in apportioning the effects produced by the law among the several carriers. As noted earlier, property in use for competitive profits ultimately rests on the cost differences of which these profits are the expression. By treating railroads as a whole for rate purposes, their differing costs, on which rested the various differential positions ranging from the high to the low, have been merged into an average. While this has eliminated the advantage of the low cost road it has at the same time broken down the guerrilla position of the weak road, driving it out of its trading position where it could compel a division with the strong road.

Under such change of the original status where each road might force its terms as it could, the individual road has necessarily received in return a new right. This new right is an equity in the declared policy of a reasonable return on property. To vest this equity in a mere abstraction, the statistical entity of "as a whole" is mockery unless that statistical entity by its use has, as we have seen, served as a link in the chain extending the equity finally to the individual road. A declared policy of protecting railroad investment as a whole has no significance except as its effects are at last registered with individual properties.

If to reach the individual road the relief incidentally loses its quality by inequitable apportionment of the benefit, then the process is null and void because the declared purpose is thus defeated. To declare a policy of unreasonably low return to railroads may be comprehensible, though unjust and inexpedient, but to declare 6 per cent and then give in excess to some roads by taking from the weak roads is out of all reason.

The relation of the government to the railroads for purposes of taxation and for partnership in earnings is not to an abstraction "as a whole" but to actual individual roads and in the same way the levies on the shipping public by the device of the public rate are not for account of the vague abstractions "as a whole" but for account of actual individual roads. Eminent counsel have advised that the state may rightfully make individual rates for each railroad, by turn, in effecting its declared policy of a reasonable return on railroad property. In this theory the rate to each road would produce the designated return, no more and no less, except for the necessarily tentative character of control through rates based on estimated volume of future business. With equal precision the aggregate of revenue for all roads would closely approximate the aggregate return on the total property, all of which revenue being already the property of the individual roads there would be no unaccounted excesses or deficits by diversion from one road to another. But the abstract conception of the theoretical legal rate individualized to each road's needs, comes under the commercial limitation that rates cannot be individualized to each road but must be common to all for the same service, since they are collected miscellaneously from individual shippers. The rate to the public must be a composite so that any one shipper in paying a specific rate is necessarily paying for account of all the individual roads represented in that rate.

In the present case it would seem therefore that in the light of actual railroad practice prior to governmental control, in the light of existing business practice, in the light of the abstract considerations involved, in the full accord with public policy, in the plain intent of the law, in an exact regard for constitutional rights, the *net* earnings under a composite rate are for joint account of all the carriers involved in the composite rate. Among these carriers in the several respects of their individual contributions to the budget on which the legalized rate was computed, rest the equities under which the funds were collected from the shippers by warrant of law.

But the defendants objected on the ground that the provision in the law recapturing to the government one-half of the income above six per cent set the seal of government equity on these funds so they could not be touched. The obvious answer is that the government's claim is specifically to a share of net railway operating income of each individual carrier. Collections by a carrier for account of another carrier could under no circumstances be construed to be the revenue of the carrier making the collection until all outstanding claims of other carriers jointly interested in this account had been first settled.

But granting the force of the argument giving one road equity in the revenue collections made by another the objection has been raised that this equity of one carrier in the revenue collected by another carrier could not exist until the carrier which collected the revenue had first realized its constitutionally reasonable return on its own property. The answer to this objection is that the whole procedure of regulation of prices and profits is of necessity based on estimates of future business. The actual regulation is confined to one term—namely the rate. The volume of business under that rate must always be uncertain. For purposes of intelligent control the regulating body deals in estimated volume of business, absorbing in subsequent revisions of the rate its inaccuracies of forecast. In no other way could orderly control be maintained. To deny this would be to argue that since a railroad is entitled to six per cent on its investment, in failure to realize this at any time, it can without authority adjust its rates to produce the six per cent. This would be setting up the principle that the rights of the Interstate Commerce Commission to regulate a railroad did not begin until that road, as and when it could, by its own rates unauthorized by the commission had produced six per cent.

Clearly when rates authorized by the Interstate Commerce Commission for a specific purpose create a fund, the equities in that fund are not absolute but proportional. If it were otherwise the accidental possession by individual carriers of irregular proportions of that fund up to six per cent on their property as they might be able to collect the money, would at any time threaten to disrupt the whole scheme of carefully devised rate levies. It is inseparable from a plan of centralized control of railroad collections from the shipping public that the controlling agency have the power of designating the purposes of the revenue and preserving the identities thus set up.

Some Confusion as to How Equalization Applies

There has been some confusion as to what respect the equalization to be accomplished in apportioning a rate applies. The law states that the purpose to which rates must be adjusted is to produce a *net railway operating income* equal as nearly as may be to a fair return upon the aggregate value of the property of such carriers held for and used in the service of transportation. It is, therefore, in the equalization of the rate of net railway operating income that the collectivistic groupings are found. Each road logically has an equity in the aggregate of all the net proceeds derived from the use of the rate everywhere within the group.

Equities so clearly defined in the terms of the collection as was the case in the authorized increase in rates under ex parte 74, could hardly require specific authorization to place the funds which they offset in hands of their rightful owners. In case of interchange freight the aggregate of the revenue at the through rate is collected by one of the carriers for the account of all interested and is distributed to each according to his performance. This is the established practice of long years and raises exception in no quarter. In the present case the rate deduced from the operating income from all roads in the group is collected with due consideration of all the equities involved and should be distributed according to those equities automatically as a matter of course. The equities rest upon the consideration that authorized the rate; they were the respective needs of the carriers, corresponding in the analogy set up with the performance by the individual road in the movement of interchange freight.

Revision of Divisions

The proposition has been made to transfer these amounts whose equities have been located by revision of divisions among the carriers involved. This suggestion doubtless was made because the law specifically authorized revision of divisions to rectify inaccuracies and injustices from any cause. Against this it was urged that the blanket adjustments of divisions were illegal. This theory is hardly in line with good administrative practice. Certainly two or more parties at interest in a business are qualified to reduce multifarious detail to practical working approximations when the issue is strictly confined to themselves. And in their failure to agree, the referee would have the same powers with themselves.

In the New England Divisions case we have noted before the idea of restoring the misappropriated proceeds of an increase in rates has never been entirely banished despite asseverations of counsel. The amount of the relief is unconsciously set against the amount of the first injustice. But if the purpose is to rectify a first misappropriation of the fund derived from the proceeds of the general collectivistic rate there is a fatal objection to use of this device because the funds to be transferred were not directly incident to the interchange freight itself. The funds involved are derived from *all* the railway operations, not from interchanged freight alone. Furthermore, the alignment of the carriers as plaintiffs and defendants in such an issue is not based on the distinction whether they lie east or west of the Hudson river but whether their net railway operating income on which the rate was computed, was greater or less than the average of the group.

If, however, we are permitted to make capital expense one of the factors to be equalized in settlement of interchange freight charges and if further it is permissible to make through traffic the residuary legatee of operations, *i. e.*, to erect "through freight" into the position of the main product and make passenger traffic and local freight traffic the by-products, then it might be feasible, by thus starting in an opposite course from our real object to circle about and finally reach the objective, which was immediately at hand at the starting point. But the reasons so far advanced for using the divisions device do not explain their course taken in this way.

The Transportation Act is regarded by those qualified to judge as one of the greatest pieces of legislation that has ever issued from Congress. This opinion is held no less by those who disapprove the law and regard it subversive of sound principles than by those who support it. Already it is exercising influence indirectly beyond the industry to which it applies as a pattern in some respects for the legislation that must shortly issue, defining and regulating production and distribution of coal. There is disposition to consider the law as on probation with many of its implications to be developed in practice and obvious defects to be cured by supplementary legislation as and when the defects are generally understood. Under these circumstances those responsibly connected with railroad affairs regard suspiciously any efforts to revise the law until it has been well tested. There has been great enhancement of the position of the consumer asserting and enforcing his equities in production. At the same time the producer's position has been greatly secured by declaring for a reasonable return on investment, resting his values on a principle that is superior to public whim and temporary circumstance. But the law and its administration have gone but part way. Results due to efficiency and inefficiency must be separated from results due to general conditions over which the individual has no control.

Ultimate Test of the Law

The ultimate test of the law is how far it has taken from individuals the fruits of their ability, enterprise, industry and frugality and bestowed these fruits upon those of less ability, enterprise, industry and frugality at large, resulting in social loss. Or briefly, has it taken from the efficient and given to the inefficient? If it has done this in any degree was this process unavoidable in the larger integrations of commerce and industry and were the properties thus sequestered and redistributed, the actual fruits of individual initiative, industry and frugality? Or were the values sequestered due to causes quite outside and beyond individual control and therefore are these values the property (or the liability as it may happen) of the group at large where they occurred which a perfected social accounting would place to the credit (or the charge) of the group as a whole?

In free trade the consumer gravitated towards that producer who had the lowest costs and therefore offered the widest margin of gross profit to be divided between producer and consumer on such basis as they could mutually work out. The producer by sharing with the consumer his gains from economies and efficiencies traded them in as it were, for the profits on the additional business which his price concessions induced. In such competitive processes the consumer was a sort of inspector general, searching out and dealing with the most efficient producer, paying a bonus for the special efficiency in the enhanced turnover diverted to that producer and at the same time making collection himself for his own pains, in the lowered price. But now with

a fixed price the individual producer (railroad) cannot offer inducements to traffic (save for a narrow service differential). Under the Transportation Act as construed by the defendants in the New England Divisions case, and conceded by the plaintiffs while the roads as a whole have yielded to the shipper all profit above six per cent, the individual road takes to itself one-half of the profit above six per cent on the business on its own rails and has remaining the other half above six per cent to give to the government. This is all too plainly an impossible construction.

Certainly the intent of the law that rates should yield as nearly as may be six per cent on the properties as a whole expressly confiscates all the proceeds above six per cent of the group as a whole. And if the reasoning here advanced is valid, the six per cent is determined by a collective bargain and the operation under such collectivistic bargain is collectivistic, then the effects of the provision that the yield shall be as nearly as may be six per cent, reach down through the group as a whole to the individual carriers constituting the group. In other words the consumers take over all the proceeds of economies and efficiencies, leaving to neither the group nor to the individual road any part of these savings except as they can be made between rating times. Conversely by the same formula the fruits of the efficiencies of one set of carriers are made available to the less favored carriers up to the amount as nearly as may be of the declared policy of six per cent on capital, the residue above six per cent on the aggregate properties of the group as a whole, being absorbed by the shippers.

In the express provisions of the law the costs of *dis*-honest, *in*-efficient and *un*-economical management and *un*-reasonable expenditure for maintenance are specifically disallowed. The law plainly contemplates standardized efficiency, making no allowance for individual special efficiency. It makes a first gesture towards affirming the broad distinction between general disabilities on the one hand and individual efficiencies —inefficiencies on the other hand, disbarring the costs of inefficiency but not at the same time permitting premiums on efficiency. Coupled with these theoretical provisions of the law is the practical condition that up to date the Interstate Commerce Commission has made little effort to ascertain currently if managements are efficient or inefficient.

In other words the law sets up a collectivism but it is crude since the most highly developed collectivism is for the purpose of realizing and protecting the most highly developed individualism. This is an apparent paradox but on it rests the structure of all law setting up severe social obligations the better to foster and protect the most nicely adjusted individualism. Rights and restrictions rest each upon the other.

Under the law and as administered the instinct for protecting initiative breaks over the intent of the law and the logic of the situation of which the law is the expression and undertakes to make good the law's default by competitive distribution of the proceeds of a collectivistic operation. Thus blindly do natural forces extricate themselves from a situation which calls for intensive analysis and not force majeur.

It would seem that the law should declare for the positive award of extraordinary efficiency as the corollary to disallowance of the costs of inefficiency.

Hours-of-Service Report

THE INTERSTATE COMMERCE COMMISSION has issued its regular annual report showing, in detail, for each railroad company, instances in which employees have been reported as on duty excessive hours, the different provisions of the law, relating to the employment of men in train service and in telegraph offices beyond certain periods, being covered in four large tables.

The causes of delays to trains are given as reported by the railroad companies, without regard to whether or not any given case appears to have been excusable. Table IV shows that the total number of instances, all classes, of excessive time on duty, in the year ending June 30, 1922, was 31,682, or *less than one-eighth* the number reported four years before. The totals for five years have been:

1918	1919	1920	1921	1922
263,279	149,660	106,501	67,686	31,682

Table IV includes only those railroads which have reported 25 or more instances in each year 1915-1919.

The total for the year now reported is made up as follows:

Train service men:	
On duty more than 16 hours, continuously	19,701
Returning after 16 hours (continuous) without 10 hours' rest-time	198
Returning after 16 hours in the aggregate, without 8 hours' rest-time	7
Continuing on duty after 16 hours in the aggregate	1,177
Telegraphers:	
On duty more than 9 hours (24-hour offices)	9,940
On duty more than 13 hours (day offices)	659
	31,682

In Table II, giving an analysis of the primary contributing causes of delays, the tabulation is arranged to show the difference in the number of cases attributable to delays which might have been prevented, as compared with the total number of cases reported; and the attention of operating officers is invited to this table, to the end that instances of excess service attributable to preventable causes may be eliminated.

Eight-Wheel Switcher for the Boston & Maine, Built by the American Locomotive Company

Delaware & Hudson Will Maintain Dividend

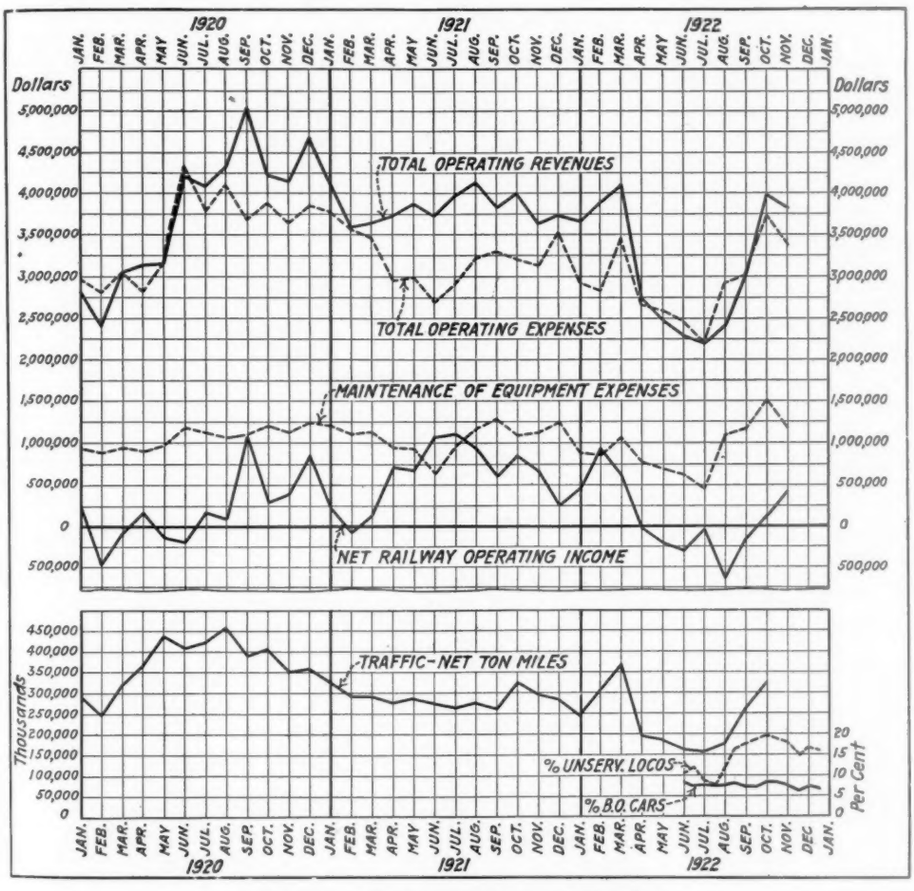
President Loree Assures Stockholders Regular Rate Will be Paid in Spite of $500,000 Deficit

STOCKHOLDERS of the Delaware & Hudson have been assured by L. F. Loree, president of the company, that although it is estimated that the net income for 1922 will fall $500,000 short of meeting operating expenses and fixed charges, there will be no change in the dividend rate. The board of managers is of the opinion, he says, that no change should be made in the dividend policy at this time, especially since the company has a large accumulated surplus created for just such purposes as the emergency which has been met in 1922.

Mr. Loree gave this assurance to the company's stockholders in a statement issued on January 11. The statement said:

"On the basis of the actual figures for the first eleven months, and estimating the results for the month of December, 1922, the company will probably fall short by about $500,000 of the amount necessary to meet its operating expenses and fixed charges. These results are directly attributable to the decrease in the volume of traffic and the extraordinary expenses resulting from the strike in the coal mines and the strike of our shop employes.

"In view of the established earning capacity of the property and the temporary nature of the conditions which reduced the earnings during the year 1922, it is the opinion of the board of managers of the company that no change in its dividend policy should be made at this time, especially as the company has a large accumulated surplus created in former years, the use of which to meet emergencies such as confronted the company during 1922, is one of the purposes for which it has been conserved."



Delaware & Hudson Traffic and Earnings

The Delaware & Hudson in 1920 had a net corporate income, inclusive of its standard return for two months of federal operation and its guaranty for the following six, and inclusive, also, of the return from its coal mining and traction operation, of $4,933,163, equivalent to 11.61 per cent on its capital stock. In 1921 the corporate net income was $4,937,452, equivalent to 11.62 per cent on the capital stock. The company pays 9 per cent dividends and has paid at that rate since 1907. The company's dividend record goes back to 1826 and except for the three short periods, 1829 to 1831, 1834 to 1838 and 1877 to 1880, this record is unbroken. The dividend requirements at present total $3,825,270. The company's general balance sheet as of December 31, 1921, showed a profit and loss balance of $32,079,644, this being the surplus which Mr. Loree says in his statement has been built up for, among other things, just such emergencies as were met in 1922.

Normally the railroad operations of the company yield a net railway operating income approximating $7,000,000 yearly. In 1921 the figure was $6,759,117. In this respect the Delaware & Hudson was something of an exception from most of the other roads in the country because there were very few roads which in that year were able to report normal net income. The Delaware & Hudson was able to do so largely because of its anthracite coal tonnage which, totaling 13,007,505, was the greatest in its history. There was an increase of 618,562 tons over 1920 and an increase of 2,527,352 tons as compared with the annual average of the test period or the average for the three years ended June 30, 1917. The 1921 traffic of all commodities combined was not as great as that for 1920 but there was, nevertheless, an increase in operating revenues and as a result the management was able to realize on the large reductions which were made in operating expenses.

Increasing Importance of Coal Tonnage

The importance of coal in Delaware & Hudson operations is shown by the fact that in 1920 the coal transportation revenues made up 48.38 per cent of the total operating revenues and in 1921, 54.93 per cent. The coal traffic has increased both actually and relatively to total tonnage in recent years. In 1912, for example, anthracite coal constituted 38.46 per cent of the company's total revenue tonnage; in 1915, this had become 44.25 per cent. In 1920, it was 42.77 per cent and in 1921, due to the combined circumstance of increased coal traffic and decreased traffic in other commodities generally, the per cent rose to 51.39.

These figures indicate the degree of vulnerability which D. & H. earnings might be expected to show to a complete cessation of anthracite coal mining operations such as took place between April 1 and the middle of September.

Mr. Loree estimates for 1922 that the company will fall about $500,000 short of meeting its operating expenses and fixed charges. This resulted from three factors. The first of these was the cessation of coal traffic. The second, was the effect on the earnings of the coal operating companies which the Delaware & Hudson Company controls through stock ownership. The third, was the shopmen's strike. We are primarily interested in the first and third factors or, in other words, in the railway operations.

Six Months With Deficit

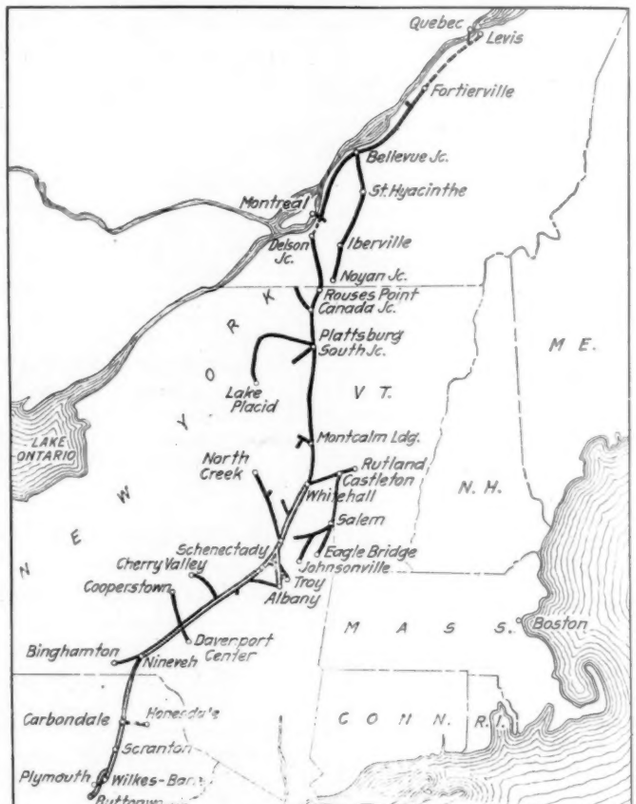
The Delaware & Hudson's latest earnings report is that for November. It showed that the company in the first eleven months of 1922 had a net railway operating income of only $1,141,777 as compared with $6,923,032 in the first 11 months of 1921. In four months of 1922—two before the beginning of the shopmen's strike on July 1 and two after—the company had an operating ratio of over 100. In August, when the effect of both factors was reflected simultaneously the operating ratio was 121.50. For six months out of the 11 the net railway operating "income" was shown in red ink. In August, the poorest month, the net operating deficit was $652,723. The month with the smallest traffic was July, and the traffic that month was but slightly below June or August. The July net ton-miles—revenue and non-revenue freight—totaled only 156,871,000 comparing with 267,406,000 in July, 1921, or with 422,526,000 in July, 1920.

Some of these factors have been plotted on a chart which is reproduced with this article. The curves on the chart show distinctly the effect of the coal and shopmen's strikes and emphasize pointedly how severely the Delaware & Hudson was affected by the former in particular. Two curves show respectively the total operating revenues and total operating expenses. The dip in the former shown between April and September shows the lack of coal traffic. The noteworthy feature is the sharpness of the drop in April and the excellent recovery in September and October. A similar trend is shown in the curve showing traffic in net ton-miles. The curve of operating expenses shows four points above the points plotted for revenues; the span in August is especially noticeable.

There is also plotted net railway operating income. There are six points shown below the base or zero line—a thing which could be possible in the case of a carrier with the earning power of the Delaware & Hudson only as a result of most adverse conditions.

Equipment

There are also plotted on the curve the maintenance of equipment expenses. The Delaware & Hudson spent slightly more for maintenance of equipment in 1921 than it did in 1920. In other words, its 1921 retrenchment in expenses was not at the expense of proper maintenance work. The results of this policy were reflected presumably in an equipment condition which on July 1, 1922, showed a percentage of bad order cars of only 7.8 per cent and a percentage of unserviceable locomotives held for repairs requiring over 24 hours of only 8.5, the former being much below the country's average and the latter so far below the average as to be striking. As the maintenance of equipment expenses curve shows, expenses were reduced with reduced traffic—a natural result with fewer cars or locomotives in service. There was a further reduction in July due to the strike and to work not being done because of lack of forces. In August and succeeding months expenses mounted rapidly—a result of the strike. For a time the percentage of unserviceable locomotives rose until on October 1 it was 20 per cent. The average for all roads on that date, however, was 25.3 per cent and it was at one time even higher. The Delaware & Hudson, therefore, was relatively very well off even when its locomotive condition was at its worst. On December 15, the D. & H. percentage of unserviceable locomotives had been reduced to 16.1 per cent. The bad order



The Delaware & Hudson

car percentage on that date was 6.6 per cent. The respective averages for all roads on that date were 22.5 and 9.4.

Favorable Outlook

There is good reason for showing all these details in chart form, for they indicate that the Delaware & Hudson has now apparently passed through the crisis which it had to meet in the form of two strikes—one, the shopmen's strike and the other the coal strike to which it was particularly vulnerable because of the relative importance of its anthracite coal traffic. Delaware & Hudson coal traffic is now back to normal. In October its shipments totaled 828,218 tons and in November, 876,861 tons, these figures comparing with 898,378 in October, 1921—the year's best month—and with 756,598 in November, 1921. The board of managers, in deciding to maintain the dividend in spite of the 1922 earnings, had in mind the favorable earnings of previous years which permitted the building up of a large surplus. They must also have decided that the emergency had been passed and have felt that conditions for the next few months were, on the whole, rather favorable.

Two Automobiles going in opposite directions crashed together on a railroad crossing. They are even beginning to fight for the privilege.—*New Orleans Times-Picayune.*

Advantages of Diesel Electric Locomotives*

Co-operative Research Bureau Advocated to Develop This Type of Equipment for the Railroads

By L. G. Coleman
Assistant General Manager, Boston & Maine

FOR THE PAST twenty-five years American railroads have been under severe criticism from many quarters and have suffered much regulation. The criticism in the past has been largely unintelligent, the result of more or less well-founded resentment of railroad practices, but producing legislation of not very constructive nature. One does not have to be a prophet to say the probabilities are that during the next two or three years criticism and regulation will be more severe than in the past, with, however, this difference,—it will be more intelligent and probably more unfair. It would appear necessary for the railroads to clean house, to make every effort to take advantage of modern ideas and methods, made possible by the rapid industrial development occasioned by the war. We have been disposed to be very conservative, to hesitate to adopt new methods. Criticism of this failure, while frequently not taking into account financial impossibilities, nevertheless has stuck, and it is one that we must combat, preferably, where possible by deeds rather than by argument. It is time to do—not to talk.

The Need for Co-operative Research

Two or three years ago the mechanical officers of the American Railway Association were asked to make a recommendation as to the advisability or desirability of establishing a research bureau. A committee was appointed to consider the matter, and after much discussion an inconclusive report was handed down, not because a majority did not think such a bureau was desirable, but, I am informed, because they doubted the possibility of obtaining necessary funds. So far as I know, the matter has never again been considered.

The railroad business is the largest single homogeneous industry in the United States. All of our major problems are common ones. Yet, any investigation along new lines, where any money expenditure is involved, whether it concerns mechanical, maintenance of way, or operating methods, must be made by individual railroads, or companies that supply their physical wants. Any real development usually requires a combination of products of companies manufacturing widely different articles. It is not reasonable to expect them to spend a great deal of money in experiments which may or may not lead to any direct gain to them. They would naturally wish to guide any development along lines requiring the least possible departure from the use of existing products, when the best result might require a complete new design.

Problems Requiring Joint Investigation

There are many applications of modern mechanical methods used in other industries which if assembled will develop a machine or process producing a saving in operating costs to the railroads. To apply these, however, much money must be spent in redesigning and experimenting, money running into millions of dollars. The only reasonable source of such funds is the railroads themselves. A central research bureau with sufficient income to obtain as needed the services of the foremost men in the country, and to finance the necessary experiments, would be of invaluable aid. The expense pro-rated would be small to each individual. The railroads are not competing with each other in money-saving devices, and as a body could experiment more efficiently and cheaply than independently. For instance, the application of gas and electricity to various railroad services, the co-ordination of motor trucks and automobiles to railroad business, the development of a manufactured tie, automatic train control, are all questions which such a bureau could efficiently and economically handle. A real service will be rendered if the mechanical and maintenance of way officers will push this matter to a conclusion.

Shortcomings of the Steam Locomotive

There is another question which in my opinion is the largest of any that such a bureau alone can practically solve. I think there will be no dissent to the statement that the steam locomotive today is probably the most uneconomical and unsatisfactory machine in industry. We have made enormous improvements, that, granting its inherent original weakness, have very much increased its efficiency as far as a power producer is concerned, but these same improvements have so increased the cost and difficulty of maintenance that the time lost in terminals practically wipes out the savings due to fuel economy obtained by modern devices, and increased unit power.

The inherent weakness of the steam locomotive is its boiler. The most efficient possible construction and maintenance of a steam boiler cannot overcome the absolutely necessary delays such as caused by washouts, hydrostatic tests, renewals of arches, cleaning of flues, examination of and repairs to grates, front ends, etc. The limiting factor of long engine divisions is usually the boiler, not the machinery. Therefore, regardless of the most efficient possible maintenance there will, due to this weakness, always be lost time in terminals by a machine that is otherwise ready for service, which can be conservatively put down at 50 days each year.

Cost of Electrification Is Prohibitive

For some years the railroads have been striving to overcome this difficulty. The remedy that has been generally grasped is electrification. Its principal weakness is the large first cost and the necessity for more or less constant load to get a high efficiency factor. Except in very few instances an approximately uniform volume of freight is unknown to railroads, nor can it be expected in the future. When a division is fully electrified, unless the entire system is brought to the same condition, flexibiliy is decreased. The electric locomotives cannot be used off the electric division. If the full efficiency of electrical operation has been obtained by doing away with coaling plants, ashpits, and other necessary adjuncts to steam operation, conversely steam power cannot be used on an electric division. This means, to take care of emergencies, an excess of electric power on the electric division and an excess of steam power on the steam divisions, where as a smaller surplus of power that can be used interchangeably will take care of two or more divisions. To obtain full benefit from electrical operation requires com-

*Abstract of a paper presented before the New England Railway Club, Boston, January 9, 1923.

plete electrification, and the first cost is frequently prohibitive.

There is little doubt that we will be unable to get much further economies as long as we continue to carry a portable steam boiler on each of our power plants, many of the economies in power production being lost by the increased terminal delay due to maintenance. To summarize briefly, the delays incidental to use of the steam boiler that can be avoided *in toto* by its abolition—washouts, hydrostatic tests, repairs due to leakage, firebox and front end maintenance, delay on ashpits and at coaling stations, and the extra expense of maintaining ashpits, coaling plants, water stations, and the delay incidental to taking water en route. Do away with the steam boiler and we do away with these delays and the ensuing costs.

Excessive Time for Repairs Increases Operating Cost

Owing to complications to modern train service schedules, many railroads are put to considerable expense if train and engine crews are delayed away from home terminal. Excessive repairs to locomotives not only mean loss of revenue upon the investment as well as increased facilities to take care of them while lying idle excessive time, but also the overtime expense due to crews held away from home, which often is a large item. It is fast approaching a state where we not only cannot double crew engines, but require more engines than crews in order to keep crews moving. This is inefficient operation. The modern locomotive has become a very expensive machine and it should be in revenue-producing service at least seventy-five per cent of the time instead of the very small percentage it now is.

There are many things that we can do and many improvements we can make that will whittle this down, but as long as we use the steam boiler the main delay will remain, and the more complicated we make the locomotive, the greater this delay is going to be and the greater the resulting expense. Most of the devices for improvement to the steam locomotive have aimed at increased boiler efficiency—superheater, feed water heater, stoker, flue blower, etc. Isn't it time to forget the steam boiler and start out with a clean slate to see if there is not some other modern method to meet our problem?

Possibilities of Diesel Electric Locomotives

There has been great development of the Diesel engine in the past five years, but only the surface has been scratched. Such engines have been projected for stationary service that will weigh in the vicinity of ninety pounds per horsepower, in which design the question of weight has not been a primary factor. Competent Diesel engine designers say that there is no reason why such engines may not be built at least as light as sixty pounds per horsepower.

A modern Sante Fe type locomotive with fully loaded tender weighs approximately 283 tons. An electric locomotive of similar tractive effort can be built at about 130 tons, and will require available at its maximum point of consumption 1,800 kilowatts. Under accepted practice this power is generated in a central stationary power plant and distributed by means of a trolley or third rail. If we can produce the current required for each electric locomotive in a movable power plant which may be attached to that locomotive, we can obtain the advantages of the electric locomotive and dispense with the disadvantages of the steam boiler.

To produce 1,800 kilowatts requires a brake horsepower of about 2,600. At 60 pounds per horsepower, this would require one or more Diesel engines of an aggregate weight of 78 tons, one or more generators not over 12 tons, a chassis to carry this load, say 40 tons, leaving 20 tons for radiation and auxiliaries. To recapitulate, for 280 tons, the same approximate weight as a Santa Fe, we may assemble a flexible, movable, fully self-contained power plant and locomotive, driven by Diesel engines using low-grade fuel, that will be at least as economical as coal, with none of the disadvantages of the steam boiler.

Design Provides Great Flexibility

The possibilities in design are so varied as to offer many opportunities for economies. Great flexibility is possible. The locomotive can be in one unit; the power plant another. The power plant itself can be subdivided. For example, the unit I have proposed would probably be made up of three or four Diesel engine generator sets mounted on a single chassis. This assembly could be so arranged that in case of failure of one of the power sets it could be replaced quickly by a spare unit and the whole restored to service in a few hours. By building the motor and power units separately they could be interchanged in case of heavy repairs being required by either.

In case of failure of one generator set the remaining ones would still be able to handle a considerable train instead of causing the complete failure that would follow a similar occurrence with one large power unit.

The electrical combinations as to voltage and amperage are increased by the possibility of hooking the units up in series or parallel. The machinery of the power plant can be under constant observation as in any stationary plant, and when one unit is cut out by reason of reduced power demand, it can receive minor adjustments without delay to the train. When such a locomotive is designed, it will be possible to run it much longer mileage between repair points than the most efficient steam engine.

I have in this brief discussion used the Diesel engine as the foundation of the scheme, because up to date it has been the most economical power producer available for the use I propose.

Other Types of Engines May Be Suitable

I am not at all sure, however, after full investigation and study, that the gas engine as used in automobiles and airplanes may not work out more successfully than the Diesel engine. The main obstacle to its use at the present time is the cost of fuel for such an assembly. It does not necessarily follow even at the present wholesale price of such fuels that the decreased weight, and first cost, and the greater flexibility gained, will not very nearly counterbalance the fuel saving of the heavier Diesel type.

There is another to me very interesting possibility which such a development would bring forth, namely, the use of fuel alcohol. If an engine should be developed using alcohol and there was any prospect of its being used in quantities, the next step, namely, a cheap supply, is a comparatively simple matter and need not be a stumbling block.

There is a third possibility, namely, the use of the Diesel engine direct, without any other than mechanical means of transmission of power. It, as you all know, has received some attention in Europe. This does not appear to me to hold forth the same promise as the use of electric transmission with its very much greater flexibility.

Research Needed to Reduce Cost of Operation and Maintenance

I have for obvious reasons only outlined this scheme in its broadest aspects. I have used only approximate weights and general description, but they are all within limits of known practice. To bring it to a successful issue will require the most painstaking work of experts in Diesel engine and electric design and many experiments.

The cost of locomotive operation and maintenance is so great today, and so much greater than in the past, that it is the most serious problem facing all railroad officers and needs heroic treatment.

To make such an investigation is out of the question for any road. It will be a light burden, if borne by all.

I believe the steam locomotive is out of date.

I believe that it is perfectly feasible to develop an equally powerful and more economical gas-driven locomotive.

I believe the railways of the country should establish a research bureau to investigate this and other matters of supreme mutual advantage.

I believe that such a bureau should be controlled by a very small committee to take complete responsibility for investigations entrusted to them, at least one and not more than three members giving their exclusive time to this work, having sufficient funds to employ temporarily, when needed, the best known experts in the world, and to finance the necessary experiments.

Whether you believe in this proposal or not, the need of a research bureau must be apparent. Use your influence to produce a resolution demanding the funds. I say "demand" because I believe the word is warranted. The maintenance officers are held responsible and should have the courage to insist upon their needs.

Discussion

Practically all who took part in the discussion endorsed Mr. Coleman's proposal to establish a co-operative research bureau. Most of the speakers took exception to the statements that the steam locomotive is inefficient and out-of-date.

G. M. Basford expressed the opinion that the locomotive should not be blamed for the fact that it is in advance of the methods of using, loading and maintaining it. Modern locomotives require increased attention, but they do so much more work that the additional expense is a paying investment.

W. E. Woodard, of the Lima Locomotive Works, stated that a research bureau rightly conducted could help greatly in the development of the locomotive, though in the past the need had been partly met by the research conducted by the Pennsylvania Railroad and the University of Illinois. He did not believe that the steam locomotive could be considered out-of-date until satisfactory equipment was available to take its place. The extremely high first cost appeared to be one of the important disadvantages of the equipment proposed by Mr. Coleman.

F. J. Carty (Boston & Albany) challenged the statement that the low efficiency of the steam locomotive is due to the boiler and pointed out that only 19 per cent of the defects reported by the federal locomotive inspectors were chargeable to the boiler and its appurtenances. There seemed to be some question as to the reliability of the Diesel engine and this defect would make it unsuitable for railroad service.

L. C. Winship (Boston & Maine) pointed out that the cost of the equipment proposed by Mr. Coleman would be so great that in some cases it would be cheaper to provide electric locomotives with central power stations and overhead conductors to distribute the current.

H. Montgomery (Rutland Railroad) questioned whether the railroads were getting full economy from modern locomotives and advocated more thorough training of employees to remedy the situation.

G. E. Ryder (Superheater Company) called attention to the high efficiency of modern locomotives and compared the size and the performance with a stationary power plant of the same horsepower, which required a building 114 ft. by 120 ft.

H. Bartlett (Baldwin Locomotive Works) stated that the locomotive builders were on the alert for improvements, not only in the steam locomotive, but also in anything that might supplant it, but he found that respect for the steam locomotive was increased by comparison with possible substitutes.

C. B. Smith (Boston & Maine) also stated that finding any equipment to take the place of the steam locomotive was a difficult problem.

In closing the discussion Mr. Coleman pointed out that those who defended the steam locomotive dwelt on its efficiency while in service, whereas he considered the crucial question to be the excessive time which the equipment spent out of service. He stated that high-speed Diesel engines are now being developed which make the internal combustion engine more adaptable to railroad work.

Car Service Division Appoints District Managers

WASHINGTON, D. C.

TO IMPROVE the supervisory functions with which it is charged the Car Service Division of the American Railway Association has assigned district managers to certain specific territories within which they will have the jurisdiction and exercise the authority of the Car Service Division. It is the purpose of these appointments to secure the establishment and maintenance of a closer and local relationship with railroad officers to the end that car distribution may meet most effectually the demands of commerce and car service rules be understood and observed. Another purpose is to provide a neutral point of contact with shippers and their associations for the purpose of a mutual understanding of common problems, particularly to secure their co-operation in the enforcement of the car service rules by a knowledge of their underlying principles and of the necessity for the rules in order to equalize car distribution between different sections of the country, also to localize the supervision over the work of car service agents engaged in checking the observance of car service rules and special instructions, and by a close contact with the operating conditions in each territory insure the practical application of such regulations.

The field men—car service agents—assigned to each district manager will be under the direct charge of and will report to the district manager. The central office at Washington will deal with district managers as to all matters within their territory, except in emergency cases where it may become necessary to deal directly with the car service agent on the ground. In territory outside that apportioned to district managers, which will be covered as heretofore from Washington, car service agents will be assigned an individual area within which they will operate continuously as far as possible.

In general, the duties of district managers are:

To supervise the handling of equipment under car service rules, and to obtain the full co-operation of every interest concerned in observance of the rules.

To assist in any practical way in the adjustment of local problems of interchange and operation and of car shortage and surplusages. Such necessary information of local conditions as may be essential to a complete understanding of the situation may be obtained from the roads in the territory.

To encourage and assist the development and operation of terminal joint inspection and interchange arrangements.

To anticipate car loading requirements when in volume and assist in arranging supply.

To keep thoroughly in touch with and advise the Car Service Division with respect to local conditions, and render all practical assistance in avoiding accumulations and congestions.

To arrange for and preside at conferences with respect to Car Service matters between operating and transportation officers of railroads in territory to which assigned whenever common interests may demand.

To maintain contact with shippers and their various organizations and as conditions may warrant arranging conferences for

purposes of assisting in transportation problems. They will also enlist the co-operation of shippers in prompt release of equipment, in heavy loading, and in all particulars respecting efficiency in car service as it is commonly understood.

To perform such other duties as may be assigned by the Car Service Division at Washington.

The work of car service agents follows in a general way that of the district managers. Subject to special instructions, their primary duties are:

Make complete and accurate investigations of the movement and loading of cars to determine the observance of car service rules, making detailed written reports in form specified, or otherwise as may be directed.

Keep actively in touch with all local conditions affecting railroad operation and car movement in territory to which assigned.

Maintain close working relations with railroad officers and employees, and local railroad associations, such as freight agents' or superintendents' associations.

Become acquainted with the traffic managers or other representatives of the principal shippers as opportunity presents and with their particular requirements, the physical conditions at their plant and other factors affecting car loading and handling. Explain the function of car service rules in the distribution of cars between different parts of the country, and the necessity for protecting the rights of ownership in cars in order to insure best possible results in car supply for shippers. Secure their co-operation in placing orders for cars in advance of requirements and in the proper selection for reloading of cars made empty in their possession.

In a circular issued by the Car Service Division certain definite suggestions are given for the work of the car service agents, including the following:

Repeat checks of individual stations or yards at reasonably frequent intervals and show in report comparison with previous results. Confer with local agents, yardmasters, superintendents, or other officials showing their record and assist in any practical way to attain improved methods.

Examine all orders in effect at stations or division offices respecting the handling or loading of cars, and report any conflict with rules. It is important to report on the extent to which local forces handling cars show a knowledge of the requirements of the rules and how effectively same are being enforced.

At freight houses, observe physical conditions and their effect on operation; also express opinion whether everything possible is being done to secure results.

Reports should show *all* violations of car service rules. At the same time any extenuating circumstances should be explained fully.

Shippers should not be required to transfer cars to avoid violation of car service rules. Better results will be obtained by the education of the shipper in proper loading. Generally a spirit of co-operation will get results. It is conceivable that extreme and continuous disregard of rules might require different methods.

On a terminal or belt line owned by one or more railroads, it should not be considered a violation of the rules for a car belonging to an owner road to be loaded between local points on the terminal road. This will not apply, however, in case of off-line loading, where car service rules will apply the same as usual.

A most flagrant and objectionable violation of car service rules is the practice which has obtained in some terminals of billing to a switching road, or other connection, cars for return loading, the loading of which is a violation of the rules. The proper practice should be for industries to place their car orders with the road on which located, and that road should not accept empty cars from a connection for such loading except on its own order when cars cannot be supplied from cars already on line.

One of the most important rules in the entire code is the first paragraph of Rule 2, commonly known as the "junction rule." It is generally agreed that the observance of this rule puts more cars on owner's rails than any other single rule. Car service agents will give particular attention to this rule.

Car Service Rule No. 12 prohibits the placing of advertisements or placards of any kind on freight cars. Reports should be made of all violations of this rule.

Do not hesitate to report on any feature of railroad operation affecting car service not directly related to the loading of cars.

Where possible, check the loading of an entire district or territory by passing reports or by general office records to determine proportion of cars apparently loaded improperly.

There should be free interchange of information and suggestion as between district managers and between car service agents that advantage may be had of any knowledge which would be mutually helpful or of benefit to the Car Service Division as a whole.

Matters reported upon by the car service agents to district managers will be progressed to a conclusion by the district manager, who will send to the Car Service Division as information copies of letters written thereon to railroad officers or report other action taken or conclusions arrived at.

While the above instructions to car service agents are given to railroads primarily as a matter of information, railroad officers also are requested to give particular attention to the following subjects:

Specific instructions in railroad offices and yards respecting the observance of car service rules.

Co-operation with shippers to secure observance of car service rules.

Cars furnished connections for return loading in violation of the rules.

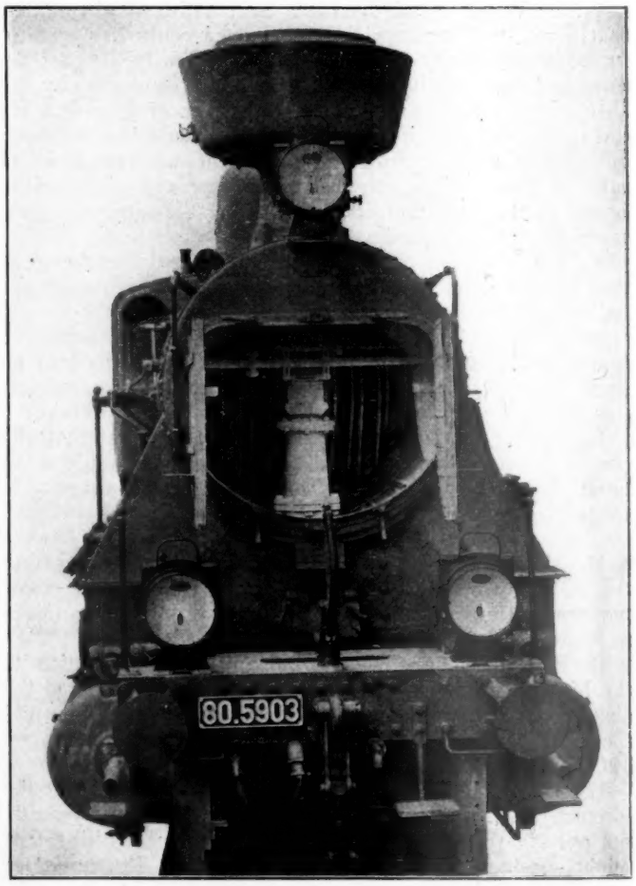
Observance of the "junction rule."

Observance of car service rule 12, advertisements on freight cars.

Delays to empty cars; cross haul of cars; and empty cars moving in the direction of loaded traffic.

The Car Service Division believes the arrangements outlined will prove of substantial assistance to the railroads in securing the most efficient observance of the car service rules.

The district managers already appointed are: J. J. Pelley, Chicago; P. J. Coleman, Minneapolis; J. A. Morris, Cincinnati; J. W. Riley, St. Louis; and G. D. Randall, Dallas. Appointments are also to be made at Toledo and Birmingham, while the Pacific Coast and Eastern districts will be handled from Washington.



An Austrian 0-10-0 Equipped with Lentz Feed-Water Heater and Schmidt Superheater

I. C .C. Consolidation Hearings Resumed

Great Northern and Northern Pacific Each Prefers Consolidation With Burlington

WASHINGTON, D. C.

HEARINGS on the Interstate Commerce Commission's tentative consolidation plan as it applies to railroads in the Western district were resumed before Commissioner Hall on Wednesday, January 17, the first day being largely devoted to a continuation of the testimony on behalf of the Great Northern in support of its contention that, if the commission finds it cannot approve of a combination of the Great Northern, Northern Pacific and Burlington, including their subsidiaries, the Great Northern should be combined with the Burlington rather than with the Chicago, Milwaukee & St. Paul, as proposed in the tentative plan, and that the Northern Pacific, rather than the Great Northern should be consolidated with the Chicago, Milwaukee & St. Paul. Walker D. Hines, counsel for the Great Northern, repeated his former statement that all three roads agree that their consolidation should be permitted and added that there is no possibility that the Northern Pacific would prefer a combination with the St. Paul, any more than the Great Northern would. He introduced as his first witness V. P. Turnburke, statistician of the Great Northern, to show the economies which might be realized by a consolidation of the Northern Pacific and the St. Paul. Mr. Turnburke had formerly been statistician of the St. Paul and said he was also familiar with the Northern Pacific and had recently made a trip over the two roads with an engineer, for the purpose of making the studies on which his testimony was based. He presented and described in detail an exhibit in which he estimated a saving of $6,500,000 a year in expenses to result from combined operation of the Northern Pacific and St. Paul, resulting from the abandonment of 372 miles of line, mainly where the two roads parallel each other through the mountain and where, he said, the local traffic was very light, and by the abandonment of a joint operation of 277 miles of track. His estimates were based on the reduction in maintenance of way, train mileage, taxes, per diem and joint facility rentals and on the assumption that the electrical operation on the St. Paul is no cheaper than the steam operation of the Northern Pacific. The savings would be increased, he said, to the extent of any saving possible from electrical operation. His cross-examination was deferred at the request of the Northern Pacific to allow further opportunity to examine his exhibits.

G. R. Martin, vice-president and Ralph Budd, president of the Great Northern, also testified. Mr. Budd agreed with Mr. Turnburke's conclusions that marked savings in operation would result from consolidation of the St. Paul and the Northern Pacific and he also pointed out that the combination of the Great Northern and the Burlington would result in a balanced car supply.

The conflict of interest between the Great Northern and the Northern Pacific in this matter was brought out specifically when Charles Donnelly, president of the Northern Pacific, took the stand. He supported strongly the proposal that the three roads should be combined and rather indicated that the Northern Pacific had been willing to rest its case on that proposal but that the testimony of the Great Northern had made it necessary for the Northern Pacific to point out its own interests in the matter. He denied that the three roads can now be considered as constituting an organization to be perpetuated and said that there are not in the United States today two railways more completely independent of each other than are the Northern Pacific and the Great Northern.

Mr. Donnelly said in part:

"To guard against misunderstanding, I wish to state at the outset that upon the fundamental question how the Burlington, Great Northern and Northern Pacific properties should be grouped there are no differences of opinion as between the directorates, or as between the executive officers of those three companies. All believe that it will be to the interest not only of the companies themselves, but as well of the territory which they serve, to allow of their consolidation. This conviction has been held consistently for a long time and nothing, either in the tentative report of the commission or in the testimony thus far submitted in this proceeding, has shaken it in the minds of the representatives of any of them. The tentative order of the commission placed the Northern Pacific and the Burlington together and placed the Great Northern with the Milwaukee. The representatives of all three companies have assumed that unless the commission could be convinced that some other grouping of these properties would be more satisfactory and desirable the tentative order would become final. They believe, as stated, that the consolidation of the three properties would be much more satisfactory and desirable. On the other hand, if the three properties cannot be consolidated, the Great Northern and the Northern Pacific would each prefer consolidation with the Burlington to consolidation with any other northwestern line; and it was inevitable that unless the Great Northern was prepared to stake everything on the case made for the consolidation of the three properties, it must, at some stage of the proceedings, submit the arguments or reasons in support of a Great Northern-Burlington grouping. These arguments have now been submitted and the Northern Pacific is of course compelled to meet them, but what we shall say in our effort to meet them is not to be taken as neutralizing or in any sense qualifying the testimony which has been submitted, or the further testimony which will be submitted in support of the case for the consolidation of the three properties."

History of the Companies

Mr. Donnelly then outlined some of the history of the relations between the three companies, showing that after the reorganization of the Northern Pacific in 1896 Mr. Hill and a number of associates purchased $26,000,000 of stock of the Northern Pacific, of which Mr. Hill held in his own name about $7,500,000. He said, however, that Mr. Hill completely dominated the Great Northern and was "first, last and all the time for the Great Northern"; that his genius and his energy was devoted throughout to the promotion of the Great Northern—that is to say, of the Northern Pacific's most formidable competitor, while from 1896 to 1901 the affairs of the Northern Pacific were dominated by J. P. Morgan & Co. He quoted testimony of J. P. Morgan that looking to the interests of the Northern Pacific and to give it a line to Chicago he had proposed the purchase of the Chicago, Milwaukee & St. Paul and had proposed to share it with the Great Northern. Mr. Hill had preferred the Burlington and when the St. Paul directors decided that they would not let them have the road on any terms he had told Mr. Hill to go ahead and see what he could do to acquire the Burlington. Mr. Hill's testimony shows, however, Mr. Donnelly said, that the Northern Securities Company was born of the desire of large owners of Great Northern stock to unify their holdings under a single control and its forma-

tion had no relation whatsoever to the purchase of the Burlington.

Mr. Donnelly then replied to a statement by Mr. Budd in his testimony in this proceeding, in speaking of the character of transportation service which it is desirable to afford, that "James J. Hill had exactly such service in mind when he formed the above mentioned association, known as the 'Hill Lines.'"

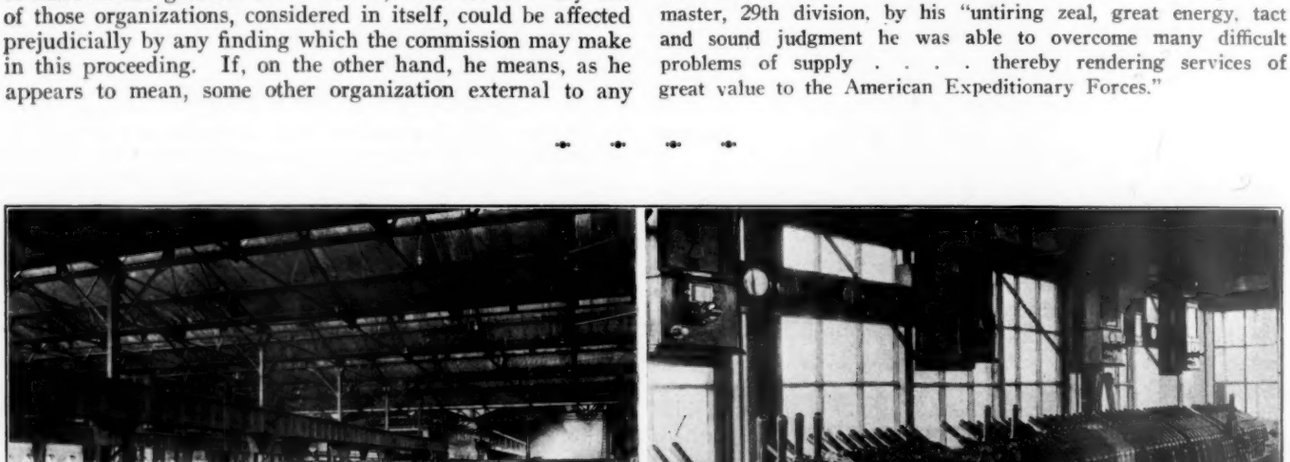
"The use of the term 'Hill lines,' as signifying the Northern Pacific, Great Northern and Burlington railroads, has become more or less generally current, and taken merely as a badge, its use is not in itself objectionable or misleading," said Mr. Donnelly. "But when taken with its natural implications, as signifying a line to the promotion of whose fortunes Mr. Hill's great gifts were devoted, there is, in the light of the testimony in the Northern Securities case, and in the light of the competitive struggle of the past 20 years, not merely historical inaccuracy, but a touch of something like irony in speaking of the Northern Pacific as a Hill line. The line in which Mr. Hill's interests and affections were centered was the Great Northern. He was engaged in promoting its interests in territory where it competed with the Northern Pacific—where for a long time the Northern Pacific was its only competitor; and from the very necessities of the situation his authority and influence were, in a large sense, not merely not promotive of, but in fact inimical to the interests of the Northern Pacific. His ownership of the stock of the Northern Pacific, which was large in the period immediately following the re-organization of that property, was greatly reduced as time went on, and when he died, in 1916, his ownership of Northern Pacific securities was inconsiderable in comparison with his holdings of the securities of the Great Northern.

"An erroneous impression is conveyed, also, as I think, by what Mr. Budd says of the detrimental influence upon the efficiency of the organization of placing these properties in different groups. 'The effect of such a disorganizing influence,' he says, 'can hardly be over-estimated.' I do not know of what organization Mr. Budd is speaking here. If he refers to the organization of the Burlington or of the Great Northern or of the Northern Pacific, it is difficult to discover the grounds for his fears, or to see how any one of those organizations, considered in itself, could be affected prejudicially by any finding which the commission may make in this proceeding. If, on the other hand, he means, as he appears to mean, some other organization external to any one of these three, the answer is that there is no such organization in existence, and therefore no such thing to be disorganized. The last vestige of anything answering to the description of a central controlling authority disappeared in 1904, when the Supreme Court required the Northern Securities Company to relinquish its control of the stock of the northern lines. When that company was formed the holders of the stock of the Northern Pacific numbered something less than 1,000; those of the Great Northern less than 2,000. Today the Northern Pacific has approximately 37,000 stockholders, the great Northern, I am informed, about 45,000; and of these the number owning stock in both companies, as well as the value of the stock thus held, is comparatively small.

"The directors and the executive officers of the Northern Pacific consider it to be of the first importance, therefore, that however these properties may be ultimately grouped, the commission, on approaching the question of their grouping, should have a clear understanding of their relations to each other. There are not in the United States today two railway companies more completely independent of each other than are the Northern Pacific and the Great Northern; and while we believe the consolidation of the Northern Pacific, Great Northern and Burlington railroads in every way desirable, this is not because their consolidation would perpetuate an existing organization, but because the creation of such an organization would promote at once the interests of the territory served and of the owners of the securities of the three companies."

The hearing was to be interrupted on Friday and Saturday by the oral arguments on the application of the Southern Pacific to retain control of the Central Pacific and is to be continued on January 22 with testimony on the proposed Union Pacific-North Western system, the Santa Fe system, and the Southern Pacific-Rock Island system.

WALTER V. SHIPLEY, division passenger agent of the Baltimore & Ohio at Washington, D. C., has been decorated with the Distinguished Service Medal for exceptionally meritorious service in the World War. As lieutenant-colonel and division quartermaster, 29th division, by his "untiring zeal, great energy, tact and sound judgment he was able to overcome many difficult problems of supply . . . . thereby rendering services of great value to the American Expeditionary Forces."



Boiler Shop and Signal Tower at Salt River, South Africa

General News Department

Sir Henry Thornton, president of the Canadian National, has announced that the rule, heretofore in effect, that employees of the railway must not accept public elective positions, has been rescinded.

A hospital campaign, at Altoona, Pa., for the benefit of the Altoona and Mercy hospitals, has received a contribution from the Pennsylvania Railroad of $25,000, payable in installments extending over two years.

The Mechanical Division of the American Railway Association will hold its annual meeting in Chicago, beginning on Wednesday, June 20. Sessions will be continued through two or three days, or until the business on the docket is disposed of. Secretary V. R. Hawthorne expects to issue the detailed program within a few weeks.

The bondholders of the Chicago, Peoria & St. Louis have filed in the Federal Court at Springfield, Ill., a suit for $1,000,000, against the Illinois Terminal Railroad Company (Alton), claiming that the failure of the terminal company to carry out a signed agreement to help reorganize the Chicago, Peoria & St. Louis was the cause of the latter road's failure.

A southbound express of the Pennsylvania railroad was derailed at Halethorpe, Md., seven miles south of Baltimore, on January 9, by a motor truck which was caught on a highway crossing. The locomotive, tender and baggage car were overturned and the baggage car fell down a bank, but no person was seriously injured. The engineman and fireman jumped off and were slightly injured.

Freight claim prevention is the latest topic announced in the radio world. Messages on this subject are sent out from the Westinghouse station, KDKA, at East Pittsburgh, Pa. The first message, prepared by the Freight Claim division of the American Railway Association, was sent out on the evening of January 3, and was followed by a similar message on the 10th. Additional information will be given to the world on subsequent Wednesdays.

The St. Louis Southwestern, on January 4, before Justice Hoehling of the supreme court of the District of Columbia, was denied, the mandamus asked for against the Interstate Commerce Commission to compel it to permit counsel for the railway to examine records of the Bureau of Valuation, which the company claims are public records. The company also sought an order directing the commission to summon certain officers and employees of the valuation bureau to testify at a hearing on a protest by the railroad against the tentative valuation placed on its property.

Refusal to call off strikes on the Missouri & North Arkansas and the Atlanta, Birmingham & Atlantic, declared early in 1921, was voted on January 14 by chiefs of the sixteen standard railway unions, meeting at Chicago. Both railroads, tied up for a time, are now operating. On authority from a federal court, the Atlanta, Birmingham & Atlantic's receivers reduced wages and the men went on strike before the Labor Board had considered the dispute. A similar situation exists on the Missouri & Northern Arkansas. The receiver invited the workers to return at a 25 per cent reduction, but promised to increase wages as earnings warranted, and meantime to pay no dividends or bond interest. The offer was rejected.

The Associated Employees of Beech Grove, Inc., an incorporated organization of employees of the Cleveland, Cincinnati, Chicago & St. Louis locomotive shops at Beech Grove, Ind., which are now operated under the supervision of the Railway Service & Supply Corporation, have united with that corporation in a suit against the Railroad Labor Board. The request of this corporation for a writ of certiorari was announced in the *Railway Age* of December 2, 1922, page 1062. The employees' organization in their petition assert the rights of the majority at Beech Grove were ignored by the Labor Board when it handed down its decision restraining the road from contracting for its shop work at Beech Grove and Brightwood, Ind.

The state of Kansas is making an effort to determine the cost of the railroad strike in Kansas last summer. Some information has been gathered to determine the cost of the strike to the public in the form of added police protection and militia. The cost to the railroads is the subject of questionnaires which ask for detailed information. This includes the number of employes in each of the shop crafts, June 30, July 8, September 1 and October 1, the ton mileage handled during the first three months of the strike, exceptional expense to the roads during the period of the strike and the approximate loss of wages to employes who were on strike. The State Industrial Court is also investigating the contracts the roads have made with shop employes and has requested copies of the applications the employes must sign in order to secure employment. Copies of the constitution, by-laws, rules and regulations of the new unions have also been called for.

1923 Meeting of A. S. T. M.

The twenty-sixth annual meeting of the American Society for Testing Materials will be held at the Chalfonte-Haddon Hall hotel, Atlantic City, N. J., beginning on Monday, June 25, and ending on either Friday or Saturday of that week, depending on the development of the program.

Larger Appropriations for I. C. C.

A larger appropriation for the Interstate Commerce Commission for the fiscal year 1924 than that allowed by the House of Representatives or that recommended by the Bureau of the Budget was recommended to the Senate on January 17 in the report of the Senate appropriations committee on the independent offices appropriation bill. The House had passed the bill providing for an appropriation of $4,564,500 for the commission as recommended by the House appropriations committee, an amendment to increase the appropriation for valuation work from $1,000,000 to $1,280,000 having been rejected. The Senate committee, however, proposed an increase of $250,000 for valuation work, $200,000 for general expenses and $50,000 for safety work.

Vigilance Committee Hangs a Striker

The Missouri & North Arkansas Railway has been the scene of a lynching, the outcome of a desperate contest which has been going on during the past few months between the citizens of the towns along the line, who desire to see the road operated in peace, and the striking employees and their sympathizers, who have persistently obstructed the operation of trains. On Monday, January 15, several hundred citizens from various points along the line congregated at Harrison, Ark., and expressed the determination to "carry out a general house cleaning." Armed men patroled the streets searching for strikers, and took suspected persons before a committee for questioning, endeavoring to find clues to the destruction of railroad property. A hotel keeper, who was charged with being active in behalf of the strikers, was whipped in the public square, and a police officer was flogged and ordered to leave town. On Tuesday morning, the body of a striker was found hanging from a bridge near the railroad yards.

Ten bridges have been wrecked or damaged, the last one having been burned on the night of January 12; and eight of the strikers are under arrest, charged with arson.

The Governor of Arkansas ordered the assemblage of a com-

pany of militia, but on Tuesday night the order was suspended, the Governor having been assured that the civil authorities could deal with the situation. Harrison is 126 miles east of Joplin.

On Wednesday it was reported that two or more of the striking employees had been convicted and sentenced to imprisonment, for seven years or more, on charges of arson. One or more of the men pleaded guilty.

It was also reported on the same day that 20 strikers had been publicly whipped by citizens of Leslie, Ark.

J. E. Edgerton, president of the National Association of Manufacturers, telegraphed to the Governor of Arkansas, calling for prompt investigation of the lynching; calling attention to the fact that this abuse of strikers was an offense against the law in exactly the same way as was the abuse of non-union men at Herrin, Illinois, last Summer.

The Southeastern Carmen's Interchange Association

The Southeastern Carmen's Interchange Association is the name of an organization which is being formed by men in the Atlantic and Gulf States from Maryland to Louisiana, inclusive, and including also Tennessee, for the purpose of promoting efficiency in the work of the interchange inspectors and also to stimulate proficiency in dealing with the M. C. B. rules.

At a meeting held recently in Washington, D. C., J. A. Masters was chosen secretary-treasurer of the association. Mr. Masters is billing instructor on the Seaboard Air Line, at Portsmouth, Va. He expects, in the near future, to announce a meeting to form a permanent organization to be held at Atlanta, Ga.

It is proposed that all men having to do with the building or the maintenance of either passenger or freight cars shall be eligible to membership.

Labor Board Refuses to Docket Case Brought by R. C. Greenley

The United States Railroad Labor Board has refused to docket an ex parte submission brought before it by R. C. Greenley, general chairman of the United Association of Railway Employees of North America. Mr. Greenley asked that the Board rule that his organization be entitled to negotiate a new contract with the Michigan Central to supersede that now held by the Switchmen's Union of North America. The switchmen's contract with the Michigan Central covers the entire system west of the Detroit river.

The refusal of the Board to accede to Greenley's request was based upon the fact that he offered no evidence to prove that his organization represented a majority of the employees of the class involved—yard conductors, yard brakemen, and switch tenders—on the entire right-of-way west of the Detroit river, the territory covered by the contract that he wished to displace.

N. C. & St. L. 75 Years Old

"Three Quarters of a Century" is the headline of an advertisement which is being published in Southern newspapers by the Nashville, Chattanooga & St. Louis Railway, next Wednesday, January 24, being the 75th anniversary of the organization of the company. This anniversary is being made the occasion of numerous public addresses by the president and other officers of the road, with a view to promoting a better acquaintance between the railroad and the public. The newspaper advertisement says, in part:

"This, the first railroad to connect the Central South with the sea was conceived by men whose lives constitute the history of a great epoch of development. It was financed by the people and the communities it was built to serve. Men who had to use the ox-cart and stage-coach knew how to appreciate the iron horse. The pioneers planned a road from Nashville to Chattanooga. Today it operates from Memphis, Hickman and Paducah, on the north and west, to Atlanta and Gadsden, on the south and east, with a dozen branches.

"It has outstanding $16,000,000 of capital stock and $18,000,000 of bonds, much less than the value of the property devoted to the public service. During the 75 years of its corporate life it has never been in a receiver's hands nor forced to reorganize.

"Management and men alike have been drawn from the communities served. They know and are sympathetic with local needs. It is the desire of the company to meet the ever increasing demands of the commerce of this section, and to do it at reasonable rates. . . . This company has fulfilled the promise of its founders, and has kept faith with its owners, its employees and the public. On its record of three-quarters of a century it asks the continued co-operation of the public it serves."

Labor Board Hears Disputes With Train Service Employees

Hearings in all unsettled disputes between the railroads and their train service employees which have been submitted to the Railroad Labor Board since 1920, were begun on January 15. Questions of both wage rates and rules are included. As stated in last week's *Railway Age* the majority of the disputes in which the larger roads were involved have been settled by agreement, many of them since the Board announced in November that hearings on these disputes would begin on January 15.

The following table shows the railroads which are participating in the present hearings, and the organizations with which they have disputes, divided between those involving wages and those involving rules and working conditions:

Carriers	Wages	Rules
Bessemer & Lake Erie	.....	EFCT
Bangor & Aroostook	.....	CT
Chicago, Peoria & St. Louis	EFCT	EFCT
Cincinnati, Ind. & Western	EFCT	EFCT
Chicago, Ind. & Louisville	EFCT	EFCT
Central Indiana	EFCT	.....
Gulf & Ship Island	ECT	ECT
Kansas City, Mexico & Orient	EFCT	EFCT
Lake Charles & Northern	EFCT	EFCT
Louisiana Southern	EC-SU	.....
Memphis Union Station Co.	EF	.....
Norfolk & Western	F	F
Norfolk & Portsmouth Belt Line	EFT	EFCT
Peoria Railway Terminal Co.	EFCT	EFCT
Peoria & Pekin Union	EF	EF
St. Louis, Brownsville & Mex.	.....	EF
Southern Pacific Lines, Tex. and La.:		
Galveston, Harrisburg & San Antonio	EFCT	EFCT
Texas & New Orleans	EFCT-SU	EFCT-SU
Louisiana & Western	EFCT	EFCT
Morgan's La. RR. & SS. Co.	EFCT	EFCT
Iberia & Vermillion	EFCT	EFCT
*Houston East & West Texas	EFCT	EFCT
*Houston & Shreveport	EFCT	EFCT
Houston & Texas Central	EFCT	EFCT
Union Stock Yards of Omaha	EF	.....
Virginian	EFCT	EFCT

Practically all of these disputes have remained for the Board's decision because of certain special considerations which the carriers involved feel should have an influence upon the settlement of the controversies. Some of the roads, for instance, are including in their presentations arguments as to their financial inability to pay the wages and maintain the rules and working conditions now in effect. Others are stressing peculiar local conditions under which the application of the usual wage rates or working conditions makes economical and efficient operation almost impossible.

Note: "E" indicates Brotherhood of Locomotive Engineers.
"F" indicates Brotherhood of Locomotive Firemen and Enginemen.
"C" indicates Order of Railroad Conductors.
"T" indicates Brotherhood of Railroad Trainmen.
"SU" indicates Switchmen's Union of North America.

*Trainmen not represented by B. R. T.

A. R. E. A. Nominations

The Nominating Committee of the American Railway Engineering Association has presented the names of the following members as candidates for election for the ensuing year:

President: E. H. Lee, vice-president, C. & W. I., Chicago.

Vice-president (one to be elected): J. M. R. Fairbairn, chief engineer, C. P. R., Montreal, Que., and Edwin B. Katte, chief engineer, electric traction, N. Y. C., New York City.

Secretary: E. H. Fritch, Chicago.

Treasurer: George H. Bremner, engineering department, C. B. & Q., La Grange, Ill.

Directors (three to be elected): J. R. W. Ambrose, chief engineer, Toronto Terminals Railway, Toronto, Ont.; G. D. Brooke, superintendent transportation, B. & O. Western Lines, Cincinnati, Ohio; W. T. Dorrance, designing engineer, N. Y., N. H. & H., New Haven, Conn.; W. J. Eck, signal and electrical superintendent, Sou., Washington, D. C.; W. D. Faucette, chief engineer, S. A. L., Norfolk, Va.; C. E. Johnston, general manager, K. C. S., Kansas City, Mo.; W. H. Kirkbride, engineer maintenance of way and structures, S. P., San Francisco, Cal.; F. J. Stimson, chief engineer maintenance, Southwestern region, Pennsylvania,

St. Louis, Mo., and Louis Yager, engineer maintenance of way, N. P., St. Paul, Minn.

Members of Nominating committee (five to be elected): C. W. Baldridge, assistant engineer, A. T. & S. F., Chicago; W. J. Burton, assistant valuation engineer, M. P., St. Louis, Mo.; W. A. Clark, chief engineer, D. & I. R., Duluth, Minn.; C. E. Denney, vice-president and general manager, N. Y., C. & St. L., Cleveland, Ohio; J. L. Haugh, assistant to president, U. P., Omaha, Neb.; F. H. McGuigan, Jr., regional engineer, U. S. R. A., Chicago; J. V. Neubert, engineer maintenance of way, N. Y. C., New York City; W. H. Penfield, engineer maintenance of way, C. M. & St. P., Chicago; J. A. Peabody, signal engineer, C. & N. W., Chicago, and H. N. Rodenbaugh, chief engineer, F. E. C., St. Augustine, Fla.

Wage Statistics for October

The Interstate Commerce Commission's monthly summary of reports of employees, service, and compensation shows that the employment and pay-roll expense of Class I railroads were greater in October, 1922, than they were in any month since July, 1921, when the new classification and forms of report were put in use. Compared with the returns for September, 1922, the total number of employees shows an increase of 95,724, or 5.6 per cent. The total compensation increased $16,778,606, or 7 per cent. In the maintenance of equipment group the number of employees shows a small increase in comparison with conditions a year ago, but the amount of overtime continued abnormally heavy, being 18.19 per cent of the total compensation. Reports from 179 roads, employing 96 per cent of the total number of employees of Class I roads, indicate that during the month the employees received bonuses amounting to $3,706,701, in addition to amounts previously reported for loyal service performed during the strike, which amount is not included in this summary. The reports of the Pere Marquette and the Chicago, Rock Island & Gulf were received too late for inclusion in the reporting divisions in the body of this summary, but the group totals of these reports have been included in the following figures.

Compared with the previous month, the increase or decrease (D) in the number of employees, by groups, was as follows:

Executives, officials and staff assistants	97
Professional, clerical and general	D 20,745
Maintenance of way and structures	D 10,264
Maintenance of equipment and stores	113,501
Transportation (other than train, engine and yard)	D 3,407
Transportation (yardmasters, switch tenders and hostlers)	450
Transportation (train and engine service)	16,092
Net increase	95,724

The reduction in the number of employees in the professional, clerical, and general group was brought about principally by a reduction in the number of lieutenants and sergeants of police and patrolmen. In June, 1922, there were 8,482 employees in these two classes. In July, as a result of strike conditions, the number was increased to 39,430. A comparison of the number of employees and their compensation, by months, follows:

Month	Number of employees	Total compensation
October, 1921[1]	1,754,136	$237,602,959
November, 1921[1]	1,732,353	225,304,006
December, 1921[1]	1,637,151	214,921,396
January, 1922[1]	1,552,014	205,178,639
February, 1922[1]	1,545,040	194,523,427
March, 1922[1]	1,570,158	216,704,408
April, 1922	1,578,133	203,413,071
May, 1922	1,628,228	216,672,028
June, 1922	1,685,414	222,932,689
July, 1922	1,467,824	193,571,244
August, 1922	1,594,074	224,976,644
September, 1922	1,708,591	238,735,394
October, 1922	1,804,315	255,514,000

[1] Excludes Detroit, Toledo & Ironton Railroad.

C. F. Loweth Elected President of American Society of Civil Engineers

Charles F. Loweth, chief engineer of the Chicago, Milwaukee & St. Paul System, was elected president of the American Society of Civil Engineers at its annual meeting in New York this week.

C. F. Loweth

Mr. Loweth has been a member of this association for 40 years and has served previously as a director and as a vice-president. He was a representative of this society on Engineering Council from 1918 to its dissolution. Mr. Loweth is a past president of the Western Society of Engineers, Chicago, and of the Civil Engineers Society of St. Paul, and has served the American Railway Engineering Association as treasurer and as a director for two terms.

Charles F. Loweth was born at Cleveland, Ohio, on March 3, 1857, and was educated at Oberlin College, Oberlin, Ohio. His first engineering service was as a rodman on surveys on the Cleveland, Lorain & Wheeling, now a part of the Baltimore & Ohio in 1876. He was employed later as a draftsman for the Atchison, Topeka & Santa Fe. In 1881-1882, he was engaged as an engineer in the construction of the Des Moines & Northern and the St. Louis, Des Moines & Northwestern railways (now parts of the Chicago, Milwaukee & St. Paul). The following year he served in an engineering capacity with Raymond & Campbell, bridge builders, Council Bluffs, Iowa, following which he was in consulting engineering practice in St. Paul, Minn., until 1901, during which time he designed and supervised the construction of water works,

Kadel & Herbert

Five Sections of the Twentieth Century Limited Ready to Leave La Salle Street Station, Chicago

sewerage and electric lighting systems for more than 100 municipalities throughout the Northwest, in addition to designing a number of bridges for various railways and public bodies. During this period he served as a consulting engineer on bridge construction for the Northern Pacific, the Minneapolis & St. Louis, the Minneapolis, St. Paul & Sault Ste. Marie and the Chicago, Milwaukee & St. Paul, and as chief engineer of the South St. Paul Belt Railway and the Davenport, Rock Island & North Western Railway. In March, 1901, he was appointed engineer and superintendent of bridges and buildings of the Chicago, Milwaukee & St. Paul, his jurisdiction being extended over the Chicago, Milwaukee & Puget Sound in March, 1906. In December, 1910, he was promoted to chief engineer of the Chicago, Milwaukee & St. Paul and from that date to January 1, 1913, when that line was consolidated with the St. Paul, he was also consulting engineer of the Chicago, Milwaukee & Puget Sound.

Officers of the Central Railway Club

At the meeting of the Central Railway Club held in Buffalo on January 11, the following officers were elected for the year 1923: President, C. L. McIlvaine, superintendent motive power, Pennsylvania Railroad, Buffalo, N. Y.; first vice-president, W. O. Thompson, general superintendent rolling stock, New York Central, Buffalo, N. Y.; second vice-president, A. R. Ayers, superintendent motive power, New York, Chicago & St. Louis, Cleveland, Ohio; third vice-president, E. V. Williams, superintendent of motive power, Buffalo, Rochester & Pittsburgh, Du Bois, Pa. The executive members elected were: John N. Gaiser, general foreman, Erie Railroad, Buffalo, N. Y.; T. J. O'Donnell, chief interchange inspector, Buffalo, N. Y.; Arthur N. Dugan, vice-president, Bronze Metal Company, New York, N. Y.

Revenues and Expenses for November

The Interstate Commerce Commission's summary of railway revenues and expenses of Class I roads for November and 11 months of 1922 is as follows:

Item	November 1922	November 1921	11 Months 1922	11 Months 1921
Average number of miles operated	235,150.74	235,291.92	235,312.10	234,993.19
Revenues:				
Freight	$389,500,810	$342,371,423	$3,642,908,833	$3,639,268,292
Passenger	[2]84,789,547	[3]82,638,361	[4]977,579,144	[5]1,065,335,416
Mail	7,546,646	7,252,398	81,623,390	85,877,425
Express	14,959,376	9,824,479	127,743,978	92,552,797
All other transportation	15,638,159	13,869,642	162,279,599	150,726,765
Incidental	9,889,315	9,553,009	104,359,906	108,771,602
Joint facility—Cr.	908,986	587,013	9,206,263	6,944,041
Joint facility—Dr.	221,153	162,931	2,024,013	1,598,663
Railway operating revenues	523,011,686	465,933,394	5,103,677,100	5,147,877,675
Expenses:				
Maintenance of way and structures	61,584,005	62,248,638	678,694,939	715,450,199
Maintenance of equipment	122,098,461	104,230,503	1,146,516,828	1,162,789,007
Traffic	7,300,644	6,676,160	79,118,195	77,235,082
Transportation	201,876,330	178,643,455	1,969,152,768	2,103,088,471
Miscellaneous operations	4,033,114	3,704,775	43,839,310	45,214,167
General	13,126,716	13,130,627	143,425,802	154,037,185
Transportation for investment—Cr.	566,058	546,687	6,045,194	5,457,284
Railway operating expenses	409,453,212	368,087,471	4,054,702,648	4,252,356,827
Net revenue from railway operations	113,558,474	97,845,923	1,048,974,452	895,520,848
Railway tax accruals	27,264,165	25,041,740	282,199,854	260,458,261
Uncollectible railway revenues	155,643	160,852	1,221,483	1,220,321
Railway operating income	86,138,666	72,643,331	765,553,115	633,842,266
Equipment rents—Dr. balance	5,589,444	4,355,775	55,078,110	49,902,064
Joint facility rent—Dr. balance	1,680,142	1,419,434	17,262,599	17,658,324
Net railway operating income	78,869,080	66,868,122	693,212,406	566,281,878
Ratio of expenses to revenues (per cent)	78.29	79.00	79.45	82.60

[1] Does not include Boston & Albany, the revenues and expenses of which are included in New York Central report.
[2] Includes $2,654,745, sleeping and parlor car surcharge.
[3] Includes $2,674,534, sleeping and parlor car surcharge.
[4] Includes $29,887,456, sleeping and parlor car surcharge.
[5] Includes $30,037,005, sleeping and parlor car surcharge.

Traffic News

Coal Production

Revised estimates of soft coal output in the first week of 1923, January 1-6, show a total of 10,895,000 net tons, according to the Geological Survey bulletin. This is 724,000 tons more than the total for the previous week. Production on New Year's Day amounted to little more than one-fourth of the average for recent normal Mondays. On the following day the output rose to a high level which was sustained throughout the week by reason of the opportunity which the holiday afforded the railroads for bettering the service. According to preliminary reports of cars loaded during the second week in January that week opened with a large production, 45,238 cars loaded on Monday, but there was a sharp decline thereafter to 34,206 cars on Tuesday and to 31,491 cars on Thursday. The total output for the week is expected to be between 11,000,000 and 11,250,000 tons.

Anthracite Shipments for December

The shipments of anthracite for the month of December, 1922, as reported to the Anthracite Bureau of Information, amounted to 6,454,876 gross tons, as compared with 4,635,922 gross tons during the corresponding month last year, an increase of 1,818,954 tons. December of this year showed a slight increase over the preceding month (November) of 34,774 tons, but reflects the effect of the holiday season.

Shipments by originating carriers were as follows:

	December 1922	December 1921	November 1922
P. & R.	1,259,927	985,262	1,224,990
L. V.	1,107,745	801,796	1,109,449
C. of N. J.	564,071	532,597	583,835
D., L. & W.	938,530	626,377	896,182
D. & H.	832,893	654,987	876,861
Penna.	561,603	307,520	546,214
Erie	738,073	450,465	706,747
N. Y., O. & W.	159,829	107,107	161,660
L. & N. E.	292,205	169,811	314,164
	6,454,876	4,635,922	6,420,120

Freight Congestion on the New Haven

The New York, New Haven & Hartford notifies shippers, through the newspapers, that freight congestion continues troublesome, and an urgent appeal is made to have cars promptly unloaded. Freight from other roads comes to the New Haven in such great volume that the current of traffic is slackened, which multiplies the perplexities.

The following daily averages are given:

	Cars on line	Cars placed for unloading	Cars unloaded	Days per car in unloading
Month of November	55,850	10,190	4,561	2.23
December 1-8	52,464	10,092	4,389	2.29
January 3-9	55,222	8,970	3,432	2.61

The statement refers to the improvements made and the additional locomotives purchased during the past few years, to the end that this traffic situation could be adequately met, and says that this condition would have been achieved except for the strike of the shopmen. Because of the strike and the continuation during several months of intimidation, violence, and sabotage, which increased the work required and also the difficulty in keeping engines in service, there was a loss roughly equivalent to four months of the normal shop output.

The new forces, now fully recruited, are maintaining current requirements and assisting in reducing the large volume of accrued repair work. The output of railroad shops and engine houses in November and December was in excess of the two months immediately preceding the strike. With the additional work being done by outside shops, the prospects are for an output of repaired locomotives in January and following months of fifty per cent or more in excess of the normal requirements. The heavy passenger travel, mail, and express movement during the holidays required 285 additional passenger trains, and the addition of 465 cars to regular trains. With this heavy demand out of the way additional power will become available for freight.

Commission and Court News

Interstate Commerce Commission

The Interstate Commerce Commission has ordered an investigation into the facts and circumstances surrounding the establishment of rail-lake-and-rail rates and routes between points in New England and trunk line territories on the one hand, and western destinations in the United States on the other hand, which are in part over Canadian rail lines in connection with the Northern Navigation Company, Ltd., a Canadian owned and operated steamship line operating between Sarnia, Ont., and Duluth, Minn. Section 27 of the merchant marine act provides that no merchandise shall be transported by water or by land and water between points in the United States, in vessels not built and documented under the laws of the United States and owned by citizens of the United States or vessels to which the privilege of engaging in the coastwise trade is extended by Sections 18 or 22 of that act.

Division of Traffic Approved

The Interstate Commerce Commission has given effect to one of the changes in the interstate commerce act made by the passage of the transportation act in issuing an order approving a proposed contract providing for the division between the Orange & North Western and the Gulf, Colorado & Santa Fe of traffic originating at and destined to points on the Gulf & Northern. The change in the act was effected by an amendment to paragraph 1 of section 5, which originally made unlawful contracts, agreements or combinations for the pooling of freight for the division of earnings, by the insertion of a proviso authorizing the commission on application to approve a divsion of traffic or earnings when it is of the opinion that such division is in the interest of better service to the public or economy in operation and will not unduly restrain competition. The approval was issued on the application of the Orange & North Western, which connects with the Gulf & Northern and also with the Gulf, Colorado & Santa Fe. The contract contemplates substantially an equal division of the traffic and provides for a revision on the request of either party should the volume or destination of the traffic change so as to materially affect the division. After a hearing the commission finds that the proposed arrangement will be in the interest of better service, to promote economy of operation, will not unduly restrain competition and that the terms and conditions under which the division is proposed to be made are just and reasonable. The approval is, however, subject to any orders and directions with respect to car service which the commission may make from time to time in conflict therewith.

State Commissions

The North Dakota Railroad Commission has been restrained from enforcing the recently adopted state grain grading act and it is expected that the question of its constitutionality will be taken to the Supreme Court of the United States. It is contended that the new law conflicts with the Federal standards of weight and measure of grain, that it tends to regulate interstate commerce, and is merely a rewriting of the old law which was declared unconstitutional.

Personnel of Commissions

Carl D. Jackson, member and formerly chairman of the Railroad Commission of Wisconsin, has resigned.

The following members have been elected to the Arkansas Railroad Commission: E. Harper, Camden, Ark., sheriff of Ouachita county, was elected chairman succeeding J. Hardage, Arkadelphia; R. C. Dalton, Parkin, secretary and treasurer of the Road District of Cross county, was elected secretary succeeding H. G. Combs; C. Henderson, Walnut Ridge, automobile merchant, will succeed J. Walker, Newport, and W. E. Floyd, Little Rock, will succeed himself.

Foreign Railway News

British Railway in Argentina Orders 340 Cars in England

The Central Argentine Railway, a British-owned line, has ordered 200 all-steel, high-side gondola cars and 140 all-steel box cars from Cammel, Laird & Co., the English car builders.

A Tunnel Through Mont Blanc

A new railway line is planned from Oex, Switzerland, on the Bellgarde-Chamonix line, to Aosta, according to the Times (London). The work involves 13 tunnels and 13 bridges. The longest of the tunnels, 15,700 yards, will be through Mont Blanc and will require four or five years in its completion.

France to Spend a Billion Francs for New Construction

According to dispatches from Paris, the superior railroad council of France has approved an expenditure of one billion francs (approximately $70,000,000 at the present rate of exchange) for improvements and betterments on the French railroads during the ensuing year. One quarter of this amount, it is said, will be devoted to electrification.

Germans to Rebuild Moscow-Minsk Railway

The Soviet military authorities have arranged with German engineers for the reconstruction of the Moscow-Minsk railway line, according to the Times (London). Minsk is on the Polish frontier. The line, as rebuilt, will be double track, one of which will be of Russian gage, 5 ft., and the other of standard gage to allow the operation of trains from other European countries to operate directly into Moscow.

Negotiations for Wage Reductions for British Shopmen Fail

A conference between railway managements and the National Union of Railwaymen for a reduction of 6 shillings 6 pence (about $1.60) per week in British railway shopmen's "war bonus" failed to bring about an agreement. The railways are seeking to reduce this "war bonus" to an extent comparable to its reduction in other metal trade industries. The extent of this reduction in other industries is 16 shillings 6 pence (about $4.10).

Regular Train-Ferry Service Between England and Belgium

A company has been formed to operate train ferries from Harwich, England, to Zeebrugge, Belgium. The company has acquired the three ferry steamers built by the British government for use during the war and will operate a regular service. These ferries will connect the Belgian State Railways with the London & North Eastern. A Belgian company will operate the terminal at Zeebrugge and will establish agencies in various European cities.

Belgium Gets Polish Locomotive Order

The Polish government has ordered 100 locomotives from Belgian concerns in the Liége district, according to press dispatches from Brussels. This contract has been predicated upon an agreement by the Belgians to send engineers and skilled workmen to Poland to build and organize railway repair shops.

It is reported also from Berne, Switzerland, that the Swiss Federal Railways have sold to a syndicate 200 steam locomotives which were withdrawn from service due to electrification. This syndicate, it is said, has received a bid from Russia for 50 of these locomotives.

Equipment and Supplies

Locomotives

THE CAMBRIA & INDIANA is inquiring for 2 Consolidation type locomotives.

THE MIDLAND TERMINAL contemplates buying 2 Mikado type locomotives.

THE CHICAGO & EASTERN ILLINOIS is inquiring for 10 Mikado type locomotives.

THE MOBILE & OHIO is inquiring for 6 Mikado type and 3 Pacific type locomotives.

THE TEMISKAMING & NORTHERN ONTARIO contemplates buying 15 Pacific type locomotives.

THE GRAND TRUNK has ordered 8 switching locomotives from the Lima Locomotive Works.

THE CANADIAN PACIFIC has ordered 16 Pacific type locomotives from the American Locomotive Company.

THE VIRGINIAN has ordered 15, 2-8-8-2 Mallet type locomotives from the American Locomotive Company.

THE PERE MARQUETTE will receive bids until 12 o'clock noon, February 1, at Detroit, Mich., for 20, 8-wheel switching locomotives.

THE LOUISVILLE, HENDERSON & ST. LOUIS reported in the *Railway Age* of December 30 as inquiring for 5 Pacific type locomotives, has ordered this equipment from the American Locomotive Company.

Freight Cars

THE GULF REFINING COMPANY, Pittsburgh, Pa., is inquiring for 300 tank cars.

THE NEW YORK, CHICAGO & ST. LOUIS is inquiring for 500 steel hopper cars.

THE CHICAGO & NORTH WESTERN contemplates buying from 750 to 1,000 refrigerator cars.

THE KANSAS, OKLAHOMA & GULF is inquiring for 400 gondola cars and 100 gondola car bodies.

THE BUFFALO, ROCHESTER & PITTSBURGH is inquiring for from 30 to 35 steel underframe caboose cars.

THE ASIATIC PETROLEUM COMPANY, 65 Broadway, New York, is inquiring for 12 tank cars of 20 tons' capacity.

THE PIEDMONT & NORTHERN is inquiring for 45 flat cars of 40 tons' capacity and one box car with attendant's quarters.

THE CHICAGO, BURLINGTON & QUINCY has placed an order for repairs to 200 refrigerator cars with the Streets company.

THE PHILLIPS PETROLEUM COMPANY, Bartlesville, Okla., has ordered 100 tank cars from the Standard Tank Car Company.

THE CHICAGO, NORTH SHORE & MILWAUKEE is inquiring for 10 general service cars and 15 gondola cars of about 50 tons' capacity.

THE NEW ENGLAND OIL & REFINING COMPANY, Fall River, Mass., has ordered 100 tank cars from the American Car & Foundry Company.

THE MOBILE & OHIO is inquiring for 500 box cars 36 ft. long and of 40 tons' capacity and 100 stock cars also for 200 hopper cars of 50 tons' capacity.

THE CANADIAN PACIFIC is inquiring for 300 composite coal cars of 75 tons' capacity, 50 oil tank cars of 50 tons' capacity and 300 steel underframe flat cars of 40 tons' capacity.

THE ILLINOIS CENTRAL reported in the *Railway Age* of January 6 as inquiring for 1,500 box cars has recalled the inquiry and will draw new specifications. This company has ordered 500 ballast cars from the Rodger Ballast Car Company.

THE UNION TANK CAR COMPANY, reported in the *Railway Age* of December 9 as ordering 500 tank cars from the General American Tank Car Corporation, cancelled this order by mutual consent of both companies and placed the order with the American Car & Foundry Company.

THE CHICAGO, ROCK ISLAND & PACIFIC, reported to the *Railway Age* of January 13 as about to place an order for 500 automobile cars, 250 refrigerator cars and 250 flat cars, has ordered the automobile cars from The Bettendorf Company, the flat cars from the American Car & Foundry Company and the refrigerator cars from the General American Car Company.

Passenger Cars

THE ILLINOIS CENTRAL is inquiring for 50 all steel passenger cars.

THE MOBILE & OHIO has ordered one baggage and express car from the Pullman Company.

THE CANADIAN PACIFIC is inquiring for 12 combination mail and baggage cars, also for 6 cafe parlor car frames and 6 buffet car frames.

THE BROOKLYN RAPID TRANSIT COMPANY, reported in the *Railway Age* of November 18, as inquiring for 50 trailer cars for use in its subways, has ordered this equipment from the Pressed Steel Car Company.

THE MISSOURI PACIFIC, reported in the *Railway Age* of December 23 as inquiring for 13 suburban coaches and 4 combination passenger and baggage cars, has ordered 17 steel coaches from the American Car & Foundry Company.

Iron and Steel

THE LEHIGH & NEW ENGLAND is inquiring for 350 tons of steel for bridges.

THE GREAT NORTHERN has ordered 440 tons of structural steel from the Wisconsin Bridge & Iron Company.

THE NEW YORK CENTRAL, reported in the *Railway Age* of December 16 as having received bids for 1,300 tons of steel for bridges, has awarded contracts for 500 tons to the American Bridge Company, 600 tons to the Mount Vernon Bridge Company, and 275 tons to the Shoemaker, Satterthwait Bridge Company.

Machinery and Tools

THE SOUTHERN PACIFIC has placed an order for an axle lathe.

THE LOUISVILLE & NASHVILLE has placed an order for a 40-in. planer.

THE MISSOURI PACIFIC has ordered a 200-ton locomotive hoist from the Whiting Corporation.

THE TEXAS & PACIFIC has placed orders for a set of bending rolls, also for two plate flanging clamps.

THE NEW YORK, NEW HAVEN & HARTFORD has placed orders for a 2,000-lb. steam hammer and a 36-in. lathe.

Signaling

THE ILLINOIS CENTRAL has ordered from the Hall Switch & Signal Company, Garwood, N. J., 28 electric semaphores, upper quadrant, style L. With this installation the Illinois Central will have in use nearly 500 signals of style L.

THE PHILADELPHIA & WEST CHESTER TRACTION COMPANY is to enlarge its terminal at 69th street, Philadelphia, and will add 35 switches and 10 signals. The interlocking at this terminal is electro-pneumatic and color light signals are used. The material is to be furnished by the Union Switch & Signal Company.

Supply Trade News

The Pressed Steel Manufacturing Company, Chicago, is preparing plans for a two-story factory and office building at East Chicago, Ind., to cost approximately $700,000.

Major J. L. Hays has joined the sales organization of the **Safety Car Heating & Lighting Company,** New Haven, Conn., as commercial engineer, and will be located at the Philadelphia, Pa., office. Major Hays graduated from Lehigh University in 1909 with a degree of electrical engineer and then joined the electrical department staff of the Baltimore & Ohio, working successively as mechanic, draftsman, inspector, general foreman and assistant engineer. He later served with the Seaboard Air Line as electrical engineer until he was commissioned as a major in the Quartermaster's Corps at the beginning of the war, in charge of the electrical section of the engineering branch, being responsible for electrical construction for the army in the United States. At the conclusion of the war he joined the Stone-Franklin Company as electrical engineer, serving until the Safety Car Heating & Lighting Company absorbed the car lighting interests of the Stone-Franklin Company on January 1 of this year.

J. L. Hays

The Western Electric Company, New York, made important organization changes effective January 15, as follows: **F. A. Ketcham,** general sales manager, has been appointed general manager of the supply department, and **G. E. Cullinan** succeeds him as general sales manager. Mr. Cullinan entered the employ of the Western Electric Company upon his graduation from Williams College in 1901 and for several years was connected with the New York Office. He went to St. Louis in 1907 where he served as manager from 1909 to 1918 and then went to Chicago as central district manager. **L. M. Dunn,** for the past three years manager of the eastern district, which includes the New York and the New England territory, has been appointed general merchandise manager on the general manager's staff. **W. J. Drury** succeeds Mr. Dunn as manager of the eastern district. Mr. Drury has been sales manager at New York for the past three years, and is succeeded in that capacity by **J. F. Davis** who has been sales manager of the Boston branch for the same period. **T. E. Burger** has been made sales manager at Boston. Mr. Burger was for 13 years connected with the Los Angeles and San Francisco organizations having served as sales manager of the former. More recently he has been on the staff of the Society for Electrical Development, returning to the service of Western Electric organization in 1922. **W. P. Hoagland,** sales manager at Chicago, has been appointed central district manager in charge of the Chicago and Minneapolis branches. **J. H. Gleason,** power apparatus sales manager at Chicago, has been appointed Chicago sales manager. **H. L. Grant,** for the past three years general appliance sales manager at New York, has been appointed Erie district manager, a new grouping of the distributing houses at Cleveland, Pittsburgh, Detroit and Cincinnati. Mr. Grant's headquarters will be at Cleveland. **A. M. Collins** continues as manager at Cleveland.

G. E. Cullinan

The Superior Iron Works, Superior, Wis., has increased its capital stock of $70,000 to $120,000 and will use a part of the new issue in improving its equipment and enlarging its plant.

The Fairmont Gas Engine & Railway Motor Car Company, Fairmont, Minn., have opened an office at 14 East Jackson boulevard, Chicago. **M. A. Evans** has been appointed district sales manager, with headquarters at Chicago.

J. E. Meek, general manager of the railroad and U. S. government departments of Johns-Manville Inc., New York, and a director of the company, who has been in the railway supply service for the past 25 years, will leave shortly on a vacation trip around the world. He will leave New York on the steamer Samaria sailing January 24. Mr. Meek will visit Madeira, North Africa, Italy, Egypt, thence through the Suez Canal to India, Java, China, Manila, Japan, Honolulu, then San Francisco. He will return via the Panama Canal to New York about June 1.

Obituary

Albert H. Miller, chief metallurgist at the Midvale Steel Company's Nicetown plant, died on January 11 at his home in Ambler, Pa., at the age of 43.

Francis J. Cole

Francis J. Cole, until recently chief consulting engineer of the American Locomotive Company, died on January 11, at his winter home in California. By Mr. Cole's death the railway field lost a man who was generally recognized as one of the leading locomotive designers of his day. From his eighteenth birthday when he became an apprentice machinist in the Mount Royal shops of the Northern Central Railroad, Baltimore, Md., until his retirement approximately one year ago, his whole life was devoted to this field.

Francis J. Cole

Mr. Cole was the son of an English Episcopal clergyman, who came to the United States and settled on a farm in Virginia, Francis being a young boy at the time. Farm life, however, did not appeal to him and he became an apprentice machinist as noted above. After serving his time, he accepted a position as draftsman under William H. Harrison on the Baltimore & Ohio, at Newark, Ohio. Being young, ambitious and continually seeking advancement he shortly left the Baltimore & Ohio to become a draftsman on the West Shore, at Frankfort, N. Y., under R. H. Soule, superintendent of motive power. John Player, Mr. Cole's immediate superior, was the mechanical engineer. Also it was here that Mr. Cole became associated with J. E. Sague, who was one of the other draftsmen and with W. F. Dixon, who was a special apprentice.

The impression of his usefulness that he had left with the

B. & O. at Newark was such that after a short time of employment at Frankfort, he was offered the position of chief draftsman of the B. & O. at Newark, Ohio. Here he further established his ability, resulting in his transfer to the Mount Clare shops as chief draftsman. Later, about 1890, when G. B. Hazlehurst became general superintendent of motive power, Mr. Cole was appointed mechanical engineer in charge of the design of all mechanical equipment, including cars and locomotives. His exceedingly efficient work in standardizing the design of both the locomotives and cars on this road attracted national attention. Also while on the B. & O. he published a series of articles on locomotive design, which were widely used and generally recognized as the best data available.

In the course of time Mr. Dixon, who had been an apprentice on the West Shore during Mr. Cole's short employment with that road, had become mechanical engineer of the Rogers Locomotive Works at Paterson, N. J. In the fall of 1895, when Mr. Dixon accepted an offer to go to Russia to build a locomotive works, he recommended to Reuben Wells that Mr. Cole succeed him and in 1896 Mr. Cole became mechanical engineer of the Rogers Locomotive Works.

The Rogers Works was temporarily closed in 1899. During this time Mr. Cole accepted under Mr. Sague the position of assistant mechanical engineer of the Schenectady Locomotive Works.

Later when the American Locomotive Company was formed, Mr. Sague becoming mechanical engineer, immediately appointed Mr. Cole as his assistant, and later when Mr. Sague became assistant vice-president, he appointed Mr. Cole as mechanical engineer of the company. This position was held by Mr. Cole until later in life, when wishing to be relieved of some of the arduous duties, he was appointed chief consulting engineer. This position he retained until his recent retirement.

Mr. Cole was a quiet unassuming man, who never spoke of himself or what he did. He had a vein of persistence which generally led to getting his own way, reinforced by the fact that his own way was generally right. He was a close and thorough student with an inborn determination to arrive at exact facts in all his investigations; all resulting in his becoming internationally known as an eminent authority on the mechanical design and performace of the steam locomotive. His name is written high in the annals of American locomotive building.

His best known work was during his connection with the American Locomotive Company, when he was a leading factor in standardizing the locomotive designs and methods of the different plants which were organized under one management to form this corporation.

In the adoption of the superheater Mr. Cole took a prominent part. His work on boiler ratios was a radical departure from former methods and today are universally used. He also will be remembered for his four cylinder compound of former days; and more recently as the designer of Number 50,000, the Cole trailing truck and an innumerable number of details all tending toward refinement of design. He was a bold designer, though a safe one and could never be accused of fostering any freaks.

He was a prominent member of the American Society of Mechanical Engineers, the American Railway Association, the American Society of Testing Materials and many others.

About two years ago he built a winter home in Pasadena, Cal., and within the past year retired from active business. For the past four weeks he had not been feeling at his best though not thought to be seriously ill. However, after four days of more serious illness he passed away in his sleep at his winter home in Pasadena.

He was a devoted husband, a true and loyal friend to those who were fortunate enough to know him intimately, and of a character whose life and example are only for the good.

James T. Goodwin, who since 1909 had been in the sales service of the National Tube Company, Pittsburgh, Pa., engaged in traveling in the interest of steel boiler tubes and pipe for this company, died on January 5 in the Memorial Hospital, New York City. Mr. Goodwin was born in Water Valley, Miss., in 1860 and learned the boilermaker's trade in the Illinois Central shops. In 1900 he was appointed superintendent of the boiler department of the American Locomotive Company's works at Richmond, Va., and in 1909 he resigned to go to the National Tube Company.

Railway Construction

BALTIMORE & OHIO.—This company has recently placed orders with the Phoenix Bridge Company covering the fabrication and delivery of steelwork required for two plate girder spans near Hagerstown, Md.

CHICAGO & ALTON.—This company will construct steel bridges over Hickory creek, Joliet, Ill., the Vermilion river, Lexington, Ill., and the Auxvasse creek, Auxvasse, Mo.

CHICAGO, BURLINGTON & QUINCY.—This company, which was reported in the *Railway Age* of December 9 as having authorized the construction of a second main track for six miles, between Sorento, Ill., and Ayres, to cost approximately $200,000, has awarded the contract to Cameron Joyce & Co., Keokuk, Iowa.

CHICAGO, MILWAUKEE & ST. PAUL.—This company will construct a cut-off, approximately 8 miles long, on its main line, beginning at Southeast Minneapolis and entering St. Paul from the south. The line will cross the Mississippi river on a new double track bridge which will cost over $3,000,000. Switching facilities in the new industrial district south of Minneapolis has also been planned. The new line will have a maximum grade of 0.4 per cent and will handle heavy transcontinental traffic. The extension from the present line at St. Paul into the industrial district will be built at once.

CHICAGO, ROCK ISLAND & PACIFIC.—This company is completing plans for a new passenger terminal in Chicago on the site of the present La Salle street terminal, costing approximately $85,000,000. The building will be 20 stories high and will extend from La Salle street to Franklin street fronting on Van Buren street. The plans are being made in conjunction with the New York Central.

FORT MYERS SOUTHERN.—This company has applied to the Interstate Commerce Commission for a certificate authorizing the construction and operation of a line from a point at or near Fort Myers, Fla., south to a point at or near Bonita Springs, a distance of 22 miles.

GRAND TRUNK.—This company will lower its tracks and eliminate grade crossings at Detroit, Mich.

ILLINOIS CENTRAL.—This company has awarded a contract to the W. J. Zitterell Company, Webster City, Iowa, for the construction of a gravel washing plant at Forreston, Ill., to cost approximately $45,000.

ILLINOIS CENTRAL.—This company, which was reported in the *Railway Age* of January 6 as calling for bids for the construction of a one-story frame passenger station in South Chicago, to cost approximately $18,000, has awarded the contract to the Adams Construction Company, Chicago.

ILLINOIS CENTRAL.—This company has authorized the reduction of grades near Paxton, Ill., Magnet and Alma. The present grade of 0.6 per cent at Paxton will be reduced to 0.3 per cent at a cost of approximately $500,000. The 0.6 per cent grade at Magnet will be reduced to 0.3 per cent at a cost of $600,000. The 0.4 grade at Alma will be reduced to 0.3 at a cost of $125,000.

LONG ISLAND.—The Transit Commission of New York has ordered this company to eliminate grade crossings between Jamaica, Queensborough, New York City, and the eastern boundary of the city. The work called for involves seven highway grade crossings.

PENNSYLVANIA.—This company will let a contract shortly for the construction of a new highway bridge at Garver's Ferry, Pa., on the Conemaugh division. The approximate quantities involved are as follows: 600 cu. yd. foundation excavation; 250 cu. yd. foundation masonry; 500 cu. yd. neat abutment masonry; the erection of 163,000 lb. of new and second-hand structural steel and 8,000 lb. of steel castings; and 160 cu. yd. reinforced concrete floor. The work will be in charge of George Nauman, assistant to chief engineer, Pittsburgh, Pa.

Railway Financial News

BALTIMORE & OHIO.—*Asks Authority for Equipment Trust Certificates.*—This company has applied to the Interstate Commerce Commission for authority to issue $13,875,000 of 5 per cent equipment trust certificates representing 75 per cent of the cost of 52 locomotives, 8,000 coal cars and 2 dining cars, which have recently been ordered. The certificates are to be purchased by Speyer & Co. and Kuhn, Loeb & Co., at 96.67.

CHESAPEAKE & OHIO.—*Hearing on New Directors.*—Messrs. O. P. Van Sweringen, M. J. Van Sweringen, Otto Miller, J. J. Bernet, J. R. Nutt, C. L. Bradley and W. A. Colston having applied to the Interstate Commerce Commission for authority to serve as directors of the Chesapeake & Ohio Railway Company and the following subsidiaries: Chesapeake & Ohio of Indiana, the Covington & Cincinnati Elevated Railroad & Transfer & Bridge Company, the Cincinnati Inter-Terminal Railroad and the Hocking Valley, and as the applicants are now directors of the Nickel Plate and constitute a majority of its board and if elected to the Chesapeake & Ohio Board would also constitute a majority thereof, these applications have been set for public hearing before Director Mahaffie of the Commission's Bureau of Finance, at Washington, D. C., on January 22. At this hearing all persons holding stock, bonds or other securities either of the Chesapeake & Ohio or of the Nickel Plate, or otherwise interested in the matter, will be afforded an opportunity to be heard and to present such proper evidence as they may desire.

CHICAGO & WESTERN INDIANA.—*Guaranty Certified.*—The Interstate Commerce Commission has issued a final certificate placing the amount of this company's guaranty for the six months' period of 1920 at $93,033.

DELAWARE & HUDSON.—*Annual Report.*—This company's annual report for 1922 is reviewed in an article on another page of this issue entitled "Delaware & Hudson Will Maintain Dividend."

GREAT NORTHERN.—*N. P. Pays Claim.*—The Northern Pacific had paid the Great Northern $1,500,000 in settlement of the Great Northern's claim for an equal division of interest charges resulting from the refunding of the joint Burlington 4's. This amount is less than one-half the difference in interest between the 7 per cent on Great Northern refunding bonds and 6½ per cent on Northern Pacific refunding bonds. The arbitrators, as provided in the Burlington ownership and control agreement, are Arthur Curtis James, George F. Baker and J. P. Morgan.

LEHIGH VALLEY.—*New Director.*—J. W. Robbins, assistant secretary and treasurer, has been elected a director to succeed E. T. Stotesbury, resigned.

MARYLAND, DELAWARE & VIRGINIA.—*Foreclosure Suit.*—The Girard Trust Company of Philadelphia, on January 17 filed a bill in the United States District Court at Baltimore, Md., asking that a $2,000,000 mortgage it holds against this road be foreclosed.

NEW YORK, CHICAGO & ST. LOUIS.—*Bonds Offered.*—An issue of $7,274,000 second and improvement mortgage 6 per cent gold bonds, due May 1, 1931, are being offered at par and accrued interest by the Guaranty Company of New York. The proceeds of the issue will reimburse the company for capital expenditures.

NEW YORK, NEW HAVEN & HARTFORD.—*New Director.*—R. G. Hutchins, of Hallgarten & Co., New York, has been elected a director to succeed T. De Witt Cuyler, deceased.

NORTHERN PACIFIC.—*Pays Great Northern Claim.*—See Great Northern.

TOLEDO & OHIO CENTRAL.—*Hearing on Six Months' Guaranty.*—At the request of the company the Interstate Commerce Commission has ordered a hearing to be held at Washington on January 30 on questions affecting the amounts to be charged for maintenance for the purpose of calculating the guaranty for the six months' period in 1920 following the termination of federal control.

WESTERN PACIFIC.—*Authorized to Issue Bonds.*—The Interstate Commerce Comission has authorized an issue of $5,500,000 of first mortgage bonds to be sold at not less than 92 for the purpose of purchasing freight cars.

Treasury Payments to Railroads

Since last announcement, dated December 1, 1922, payments under Sections 204, 209, 210 and 212 of the Transportation Act, 1920, as amended, have been made by the Treasury as follows:

Section 204:	
Federal Valley Railroad	$5,304
Kane & Elk	14,346
Kansas & Sidell	12,460
Live Oak, Perry & Gulf	52,469
Lorama Railroad	1,542
Marion & Rye Valley	24,244
Mississippi Eastern	38,263
New Orleans, Natalbany & Natchez	46,235
New York Dock Railway	39,044
Verde Tunnel & Smelter	121,916
Virginia Southern	6,187
Section 209:	
Atlantic & Yadkin	64,751
Blue Ridge	27,991
Carolina & Northwestern	31,313
Chesapeake & Ohio	1,078,841
Chicago, Rock Island & Gulf	273,077
Cincinnati, Burnside & Cumberland River	1,957
Delta Southern	72,393
Fort Worth Belt	18,432
Harriman & Northeastern	10,548
Hartwell Railway	6,740
Kentwood, Greensburg & Southwestern	24,067
Knoxville, Sevierville & Eastern, Receiver	22,280
Live Oak, Perry & Gulf	5,712
New Orleans, Natalbany & Natchez	16,805
Nevada-California, Oregon	20,719
New York Dock Railway	36,343
Pickens Railroad	3,239
Tallulah Falls Railway	40,979
Virginia Southern	1,990
Washington & Vandemere	3,628
Section 210:	
Wheeling & Lake Erie	400,000
Section 212:	
Colorado & Southeastern	30,000
Total	$2,553,815

Total payments to December 30, 1922—		
(a) Under Section 204, as amended by Section 212 for reimbursement of deficits during Federal Control:		
(1) Final payments, including partial payments previously made	$4,585,466	
(2) Partial payments to carriers as to which a certificate for final payment has not been received by the Treasury from the Interstate Commerce Commission	1,028,802	
Total payments a/c reimbursement of deficits		$5,614,268
(b) Under Section 209, as amended by Section 212 for guaranty in respect to railway operating income for first six months after Federal Control:		
(1) Final payments, including advances and partial payments previously made	$116,544,111	
(2) Advances to carriers as to which a certificate for final payments has not been received by the Treasury from the Interstate Commerce Commission	210,255,922	
(3) Partial payments to carriers as to which a certificate for final payment has not been received, as stated above	125,655,922	
Total payments account of said guaranty		452,455,955
(c) Under Section 210 for loans from the revolving fund of $300,000,000 therein provided		318,286,667
Total		$776,356,890

Repayments to the government amounting to $130,335,387 on account of the loans made by the Interstate Commerce Commission from the $300,000,000 loan fund had been made up to December 30 by 39 companies, according to the statement. Some of the largest loans have been repaid, including that to the New York Central of $26,166,000 and that to the Pennsylvania of $12,480,000. The Great Northern, which had received loans amounting to $33,496,000, had repaid $31,754,000. The Carolina, Clinchfield & Ohio had also repaid its loan of $10,000,000, the Northern Pacific its loan of $6,000,000, and the Boston & Maine had repaid $5,000,000 of its loan of $19,705,479.

Dividends Declared

Midi Railroad (France).—Interim dividend of 22.50 francs per share, payable after January 2, 1923, to holders of registered stock, while the unregistered stock will receive a payment of 20.74 francs per share.

Pittsburgh, Cincinnati, Chicago & St. Louis.—$2.00, payable January 20 to holders of record January 10.

Trend of Railway Stock and Bond Prices

	Jan. 16	Last Week	Last Year
Average price of 20 representative railway stocks	64.12	64.35	57.72
Average price of 20 representative railway bonds	84.61	85.56	82.52

Railway Officers

Financial, Legal and Accounting

R. A. Miller has been appointed assistant tax commissioner of the Chicago & North Western, with headquarters at Chicago.

Operating

C. S. Louden has been appointed trainmaster of the Chesapeake & Ohio with headquarters at Huntington, West Virginia. **C. L. Gilmore** has been appointed trainmaster and road foreman of engines of the Logan division with the same headquarters.

Mechanical

J. L. Brennan has been appointed acting master mechanic of the Delaware & Hudson with headquarters at Carbondale, Pa.

Robert Collett, superintendent of fuel and locomotive performance, has been appointed fuel agent of the St. Louis-San Francisco, with headquarters at St. Louis.

J. J. Callaham has been appointed road foreman of engines of the Chesapeake & Ohio with headquarters at Huntington, W. Va. **C. H. Womack** has been appointed road foreman of engines with headquarters at Peach Creek, W. Va.

J. W. Small, formerly superintendent of motive power of the Seaboard Air Line and later superintendent of motive power and shops of the Cuba Railroad, has been appointed chief mechanical officer of the Chesapeake & Ohio. He will have entire charge of the mechanical department and his headquarters will be at Richmond, Va. Mr. Small was born on September 24, 1870, at Chatham, Ont., and was educated in the high schools of that city and at the Collegiate Institute. He began railway work in 1887 as a machinist's apprentice on the Northern Pacific. In 1892 he went to Pocatello, Idaho, as a machinist for the Oregon Short Line. The following year he went to Tacoma, Wash., as a machinist for the Northern Pacific. Later in the same year he entered the service of the Southern Pacific as a machinist and served subsequently as gang foreman, roundhouse foreman, assistant master mechanic and master mechanic for that company. In 1906 he became superintendent of motive power of the Mexican lines of the Southern Pacific. In 1910 he went to the Kansas City Southern in a similar capacity and the following year became superintendent of motive power for the Missouri Pacific. The same year he went with the Sunset Central Lines (Galveston, Harrisburg & San Antonio, Houston & Texas Central, Morgan's Louisiana & Texas, Texas & New Orleans, etc.) as assistant general manager. In 1913 he was appointed superintendent of motive power of the Seaboard Air Line. Mr. Small, during federal control, served first as mechanical assistant to the regional director, Southern region, and later as mechanical staff officer to the regional director of the same region. In April, 1921, he was appointed superintendent of motive power of the Cuba Railroad with headquarters at Camaguey, Cuba, from which position he resigned in July, 1922.

J. W. Small

Engineering, Maintenance of Way and Signaling

H. H. Richardson has been appointed engineer of water service for the Missouri Pacific with headquarters at St. Louis, Mo., succeeding R. C. Bardwell, resigned.

J. M. Nicholson, assistant engineer of tests of the Atchison, Topeka & Santa Fe, with headquarters at Topeka, Kan., has been promoted to fuel conservation engineer, with the same headquarters.

Obituary

J. P. Beckwith, vice-president of the Florida East Coast, died January 4 at Miami, Fla., at the home of his son.

Alexander Hilton, vice-president in charge of traffic of the St. Louis-San Francisco, whose death on December 25 was reported in the *Railway Age* of December 30, was born at Hamilton, Ont., on June, 19, 1853. He entered railway service in 1878 as a clerk on the Great Western railway at Hamilton, Ont. A year later he entered the service of the Chicago & Alton at Chicago, as a clerk. He was promoted to city passenger and ticket agent at Kansas City, Mo., in 1884. He was promoted to Pacific Coast agent, with headquarters at San Francisco, Cal., in 1887, and held this position for one year when he was returned to Kansas City as general agent in the passenger department. He was appointed assistant general passenger agent of the Kansas City, Ft. Scott & Memphis, with headquarters at Kansas City in 1901 and served in this capacity for a short time, when he was appointed general passenger agent of the St. Louis-San Francisco. In 1913 he was promoted to passenger traffic manager. His promotion to assistant traffic manager came in August, 1918, and he served in this capacity until April, 1919, when he was promoted to traffic manager, with headquarters at St. Louis, Mo. He was promoted to vice-president in charge of traffic, with headquarters at the same place on March 1, 1920, and held this position until the time of his death.

A. Hilton

H. McClure, general inspector of freight car equipment of the Missouri Pacific, died of heart disease on January 5, while at work in his office at St. Louis, Mo.

E. A. Cuthbertson, supervisor of signals of the Northern Pacific lines west of Paradise, with headquarters at Tacoma, Wash., died on December 24, 1922, in Portland, Ore.

H. E. Freund, northern freight agent of the Alabama & Vicksburg and the Vicksburg, Shreveport & Pacific, died at Chicago on January 12, after an illness of three weeks.

William R. Mooney, general superintendent of the Boston & Maine, died on December 29 at his home in Winchester, Mass. Mr. Mooney was born in Lowell, Mass., on July 11, 1856, and was educated in the public schools. He entered railway service on June 26, 1876, as a trainman on the Boston & Lowell. From 1881 to 1893 he was a conductor on the same road. In the latter year, he was appointed trainmaster of the Boston & Maine and in 1899 he was promoted to superintendent. In 1920 he was promoted to general superintendent, in which position he was serving at the time of his death.